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THE TRANSMISSION OF CHAGAS' DISEASE.

A Critical Review.

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Although twenty-five years have passed since Chagas (1909, 1909a) published the first account of South American human trypanosomiasis or Chagas' disease, discovered by him, our knowledge of this malady is still very imperfect and there are many obscure points in its symptomatology and aetiology which require elucidation. One of these is the question of the natural method of transmission of the infection, which is closely connected with the mode of development of the causative agent, *Trypanosoma cruzi*, in the insect vector, represented by blood-sucking Reduviid bugs of the genera *Triatoma*, *Rhodnius* and *Erathyrus*.

Regarding these problems there has been a long-standing controversy between the followers of Chagas, who holds that the final infective stages of development of the trypanosome occur in the salivary glands of the insect-host and that transmission is inoculative, through the bite of the insect, and those of Brumpt, who maintains that the life-cycle of *T. cruzi* is completed in the hind-gut of the insect and that transmission is effected by faecal contamination of the mucous membranes of the vertebrate. In some text-books writers have compromised by admitting both methods of transmission, maintaining, however, that one of them was merely of secondary importance (*cf.* Wenyon, 1926, Brumpt, 1927, Reichenow, 1928, Chagas, Villela and Rocha-Lima, 1929). Both this controversy and the non-committal attitude were due chiefly to the scarcity of experimental data capable of establishing the claims of one of the rival hypotheses to the exclusion of the other. A critical revision of the life-cycle of *T. cruzi* has recently been undertaken by Dias (1934) [this *Bulletin*, Vol. 31, p. 597] and, since it settles the question under discussion beyond reasonable doubt, this is an opportune moment to review the situation historically and in its present state.

As there seems to be some confusion regarding the nomenclature of the parasite causing Chagas' disease, it should be noted that it was

originally named *Trypanosoma cruzi* Chagas, 1909. Having discovered what he believed to be stages of schizogony of this flagellate in the lungs of the mammalian host, CHAGAS (1909a) renamed it *Schizotrypanum cruzi*, but after it was demonstrated that these stages belonged to a different organism (*Pneumocystis carinii*) CHAGAS (1911) reverted to the original name, *Trypanosoma cruzi*. Since the two generic names are being used indiscriminately, it is well to point out here that *T. cruzi* is the only valid one, *S. cruzi* being its synonym.

In his earliest accounts of the life-cycle of *T. cruzi* CHAGAS (1909a, 1911) recognised two types of development of this trypanosome in *Triatoma*: (1) asexual, taking place in the mid-gut and leading to the formation of crithidia, and (2) sexual, with the production of infective forms in the salivary glands. This interpretation of the life-cycle of *T. cruzi* has—with various modifications—been maintained by CHAGAS up to the present time on the following grounds: (1) the finding, on two occasions, of trypanosomes in the *body-cavity* of some "wild" bugs, (2) the finding, on three occasions, of trypanosomes in *smears of the salivary glands* of bugs, and (3) his belief that *T. cruzi* was sexually dimorphic, the slender blood-forms representing "males" and the broad ones "females." On being taken up by the bugs these forms were supposed to take part in a sexual act (as yet not observed by the author), the resulting stages giving rise to infective trypanosomes which penetrate from the gut into the body-cavity and thence into the salivary glands. According to CHAGAS, infection of the vertebrate host is effected through the bite of the insect.* The "asexual" cycle of development was said to be of no significance, being merely a culture of the flagellate which remains non-infective.

The study of the life-history of *T. cruzi* was soon taken up by BRUMPT and others. BRUMPT and SILVA (1912) produced the first evidence that the excreta of bugs (*Triatoma*) harbouring *T. cruzi* were capable of infecting mice when injected intraperitoneally, whereas no infection resulted from the bite of these insects. BRUMPT (1912) next gave a description of the entire development of this trypanosome in Triatoma, which, according to him, proceeds as follows. In the gut of the bug the ingested blood-trypanosomes are transformed into crithidia; in this stage they multiply, gradually diminishing in size, and finally give rise to trypanosome forms again. These metacyclic trypanosomes (to use the modern term introduced by BRUMPT in 1913) are passed with the faeces and constitute the final infective stage, excreta containing only crithidia being incapable of setting up an infection. BRUMPT has also shown that the blood-trypanosomes regarded by CHAGAS as "male" and "female" forms are actually stages of growth, the former being the recent arrivals in the blood from the tissues, where multiplication takes place, while the latter are the result of the growth of these. Continuing his investigations, BRUMPT (1912a, 1913, 1913a) succeeded in infecting various mammals by placing the excreta of the bugs containing metacyclic trypanosomes upon the mucous membrane (*per conjunctivam, os et rectum*) and upon the intact skin (in young mice). However, all attempts to infect animals through the bite of infected bugs failed. BRUMPT's observations have thus demonstrated that the final stages of development of *T. cruzi* occur in the hind-gut of the bug and that the infection of the vertebrate host takes

*Though the author claims to have infected animals by this method, the results are open to criticism in view of the absence of any details regarding these experiments.

place by *contamination* with faeces containing the metacyclic trypanosomes. Both in his earlier and later works, however, BRUMPT admitted the possibility of infection through the bite, but regarded this method as exceptional and the localization of the flagellates in the salivary glands as accidental (BRUMPT, 1912a, 1927).

What can now be regarded as an amplification and confirmation of BRUMPT's account of the life-cycle of *T. cruzi* was provided by KOFOID and MCCULLOCH (1916) in their study of the development of *T. triatomae* from *Triatoma protracta*. This parasite has recently been shown by KOFOID and DONAT (1933, 1933a) to be closely related—if not actually identical, as the authors maintain—to *T. cruzi*. These observers successfully infected rats with a *T. cruzi*-like parasite by feeding the bugs to them, whereas attempts to infect through the bite failed. A number of other authors also reported positive results obtained by the contaminative method and failure to produce infection through the bite of the bugs.

On the other hand, CHAGAS' views found support in the experiments of TORRES (1913, 1915), who succeeded in infecting laboratory animals, in 3 cases (2 kittens, 1 guineapig) out of 18, by allowing infected bugs to feed on them. The bugs were placed singly in narrow tubes and had to bite through a double layer of gauze. The author regarded these precautions as sufficient to exclude any possibility of contamination of the skin with the excreta of the bug.

CHAGAS himself re-stated his old views in several new publications. In these he claims to have discovered the actual process of fertilization between " male " and " female " trypanosomes in the mid-gut of the bug (CHAGAS, 1921, and in an undated pamphlet apparently prior to 1921); of this an illustrated description was given later (CHAGAS, 1927). BRUMPT's findings were also taken into consideration but interpreted in such a manner as to fit in with CHAGAS' own hypothesis. Some difficulty was experienced, however, with the metacyclic trypanosomes. They were first (CHAGAS, 1921) regarded as the intermediate forms between the products of fertilization and the salivary gland stage of the trypanosome. Later, having discovered slender trypanosome forms in the mid-gut, CHAGAS (1927) associated these with the salivary gland stage, now relegating the metacyclic trypanosomes to the asexual cycle of development and regarding them as derived from " asexual multiplication of the male blood forms." Lastly, without any further explanation, the metacyclic trypanosomes were again included in the sexual cycle, leaving the crithidia as the final stage of development in the asexual cycle (CHAGAS, VILLELA and ROCHA-LIMA, 1929). In all these papers CHAGAS reasserts his belief in the inoculative method of transmission as the only normal one, while the contaminative method, though admitted, is regarded as an exception. The only data on which these views are based are the author's finding of trypanosomes in the salivary glands in 1909, which has never been confirmed, and the experiments of TORRES referred to above.

It is thus seen that the solution of the problem of the method of transmission of *T. cruzi* had not advanced materially during the twenty years just surveyed. Though the views held by BRUMPT, based on exact objective observations and experiments, have found more general recognition, CHAGAS' hypothesis, in spite of its highly speculative and subjective character, has never yet been entirely refuted. The problem could only be settled by a revision of the whole subject, in which the claims of both schools are experimentally tested and critically

examined in greater detail and on a larger scale than has hitherto been attempted. This task has recently been carried out at the Instituto Oswaldo Cruz by DIAS (1932, 1932a, 1932b, 1934).

This author confirmed and amplified BRUMPT's observations, but was unable to substantiate most of CHAGAS' statements, while for some he provided a different explanation. The life-cycle of *T. cruzi* was studied by DIAS in *Triatoma megista*. He found that the entire development normally takes place within the lumen of the alimentary tract (only exceptionally in the Malpighian tubes) and occupies from 6 to 15 days, according to the stage of the insect. The transformation of the blood trypanosomes into crithidia takes place in the stomach, while their multiplication proceeds in the posterior portion of the mid-gut. In the mid-gut are also found degenerating flagellates and leishmania, the latter constituting an inconstant phase. In the hind-gut, represented in the bug by the rectum alone, the crithidia become smaller and give rise to the metacyclic trypanosomes. These are discharged with the excreta (faeces and " urine, ") in which their number has been estimated at 3,500 per 1 cmm.

Although numerous insects were examined at various periods of the infection, DIAS (1934) " never encountered any evidence of sexual phenomena in the trypanosomes, nor any forms of the parasite which could be interpreted as resulting from such phenomena." The only true trypanosomes discovered in the mid-gut were *unaltered blood-forms*, which can remain there without development for several days. Likewise this observer failed to find any forms of the flagellate in the salivary glands or in the body-cavity of the bug. Though he succeeded in obtaining infection of the body-cavity of Triatoma by direct inoculation into it of flagellates, which completed their development in this situation up to the formation of metacyclic trypanosomes, he could obtain no evidence, even under such favourable conditions, of invasion of the salivary glands.

The experiments on the transmission of *T. cruzi* carried out by DIAS were numerous and varied. In attempts to transmit the trypanosome through the bite, 104 *Triatoma megista* were fed on 14 guineapigs, but in no case was an infection produced. In these experiments the risk of contamination with the faeces of the bugs was entirely eliminated. On the other hand, DIAS invariably succeeded in infecting laboratory animals by contamination of the mucous membrane with the excreta of the bug ; he was likewise able to produce infection in guineapigs and mice by placing the droppings of infected triatomas on the intact skin and by feeding bugs to these animals. DIAS also tested the infectivity of the mid-gut stages of *T. cruzi* by inoculating the intestinal contents into laboratory animals, and found that they were capable of producing an infection during the entire period of development of the parasite (up to 8 days after the infective feed). The infection in such cases was undoubtedly produced by the surviving blood-forms mentioned above, since they were actually seen in the inoculum and, moreover, no infection could be produced with the mid-gut contents of bugs with old infections in which only crithidia were present.

DIAS has thus amply confirmed the fact that the normal and infallible method of transmission of *T. cruzi* to the mammalian host is exclusively by contamination of the mucous membranes or skin with the excreta of the bug containing metacyclic trypanosomes, as in the case of other trypanosomes of the *T. lewisi* group with a similar type of development

in the " posterior station " of the invertebrate host (*cf.* HOARE and COUTELEN, 1933).

On the other hand, CHAGAS' hypothesis was deprived of its main supports, for no indication could be found either of any sexual phenomena or of the presence of flagellates in the salivary glands, which disposes both of the alleged sexual dimorphism of *T. cruzi* and of the inoculative method of its transmission. The evidence in favour of the latter actually consisted only of three cases of alleged infection through the bite of the bugs (TORRES, 1915), in which some attempt was made to exclude contamination.* Even if these precautions are regarded as flawless, it is quite possible that the infection was actually brought about by the blood-forms surviving in the gut of the bugs, which were shown to be infective (see above), and which might conceivably be regurgitated in the act of feeding.

It must be stated that DIAS (1934) himself compromised by admitting the possibility, in exceptional cases, of *T. cruzi* behaving in the manner described by CHAGAS, but the mass of evidence against this view renders even such a concession untenable.

In the foregoing account of *T. cruzi* only its development in the natural intermediate hosts (*Triatoma*, etc.) was dealt with. It is known, however, that under experimental conditions the parasite is capable of developing in bugs of the genus *Cimex* and in ticks of the genus *Ornithodorus*.

We can now consider the bearing of the laboratory experiments upon the natural transmission of Chagas' disease in man. Though no direct observations have been made on this subject, the habits of the Reduviid bugs leave no doubt that human beings are infected in the same manner as other mammals. Thus, the principal insect-vector in Brazil, *Triatoma megista*, is always found in large numbers in the dwellings, where it feeds upon human beings during the night. The bugs usually attack the face and lips of the sleepers (hence the names " barbeiros," or barbers, and " kissing bugs "), and while feeding and after a meal they habitually defaecate. According to DIAS (1934) in the endemic districts these bugs are commonly found in the beds of the inhabitants, the bedding being usually soiled with the excreta of the bugs and with blood-spots from crushed insects. It is conceivable that under these conditions infection can be produced by the droppings either contaminating the mucous membranes of the mouth, nose or eyes directly, or being introduced into the skin by scratching, while infection through the intact skin is not excluded.

REFERENCES.

BRUMPT, E. (1912). Le *Trypanosoma cruzi* évolue chez *Conorhinus megistus*, *Cimex lectularius*, *Cimex boueti* et *Ornithodorus moubata*. Cycle évolutif de ce parasite.—*Bull. Soc. Path. Exot.*, **5**, 360.

——. (1912a). Pénétration du *Schizotrypanum cruzi* à travers la muqueuse oculaire saine.—*Ibid.*, **5**, 724.

——. (1913). Evolution de *Trypanosoma lewisi*, *nabiasi*, *blanchardi*, chez les puces et les punaises. Transmission par les déjections. Comparaison avec *T. cruzi*.—*Ibid.*, **6**, 167.

——. (1913a). Immunité partielle dans les infections à *Trypanosoma cruzi*, transmission de ce trypanosome par *Cimex rotundatus*. Rôle régulateur des hôtes intermédiaires. Passage à travers la peau.—*Ibid.*, **6**, 173.

*Other experiments, in which no allowance was made for possible contamination, need not be taken into consideration.

BRUMPT, E. (1927). Précis de Parasitologie. 4th ed. (Paris: Masson et Cie).

—— & DA SILVA, P. (1912). Existence du *Schizotrypanum cruzi* Chagas 1909, à Bahia (Matta de São João). Biologie du *Conorhinus megistus*.—*Bull. Soc. Path. Exot.*, **5**, 22.

CHAGAS, C. (1909). Neue Trypanosomen. (Vorläufige Mitteilung.)—*Arch. f. Schiffs- u. Trop.-Hyg.*, **13**, 120.

——. (1909a). Ueber eine neue Trypanosomiasis des Menschen. Studien über Morphologie und Entwicklungszyklus des *Schizotrypanum cruzi* n. gen., n. sp., Erreger einer neuen Krankheit des Menschen.—*Mem. Inst. Oswaldo Cruz*, **1**, 159.

——. (1911). Ein neuentdeckter Krankheitsprozess des Menschen. Bericht über die ätiologischen und klinischen Beobachtungen.—*Ibid.*, **3**, 219.

——. [?]. Résumé de l'étiologie et des aspects cliniques de la trypanosomiase américaine.—[*Separate Pamphlet: undated.*]

——. (1921). American trypanosomiasis. Study of the parasite and of the transmitting insect.—*Proc. Inst. Med. Chicago*, **3**, 220.

——. (1927). Quelques aspects évolutifs du *Trypanosoma cruzi* dans l'insecte transmetteur.—*C. R. Soc. Biol.*, **97**, 829.

——, VILLELA, E., & DA ROCHA-LIMA, H. (1929). Amerikanische Trypanosomenkrankheit. Chagas-Krankheit.—Mense's *Handb. d. Tropenkrankh.* (3 Aufl.), V Bd., 1 Teil, p. 673 (Leipzig).

DIAS, E. (1932). O *Trypanosoma cruzi* póde evoluir na cavidade geral do *Triatoma megista*.—*Mem. Inst. Oswaldo Cruz*, **26**, 83.

——. (1932a). Sur les déjections du *Triatoma megista*. Aspects du *Trypanosoma cruzi* que l'on y rencontre.—*C. R. Soc. Biol.*, **111**, 486.

——. (1932b). Expériences sur la transmission du *Trypanosoma cruzi* de l'insecte au vertebré.—*Ibid.*, **111**, 490.

——. (1934). Estudos sobre o *Schizotrypanum cruzi*.—*Mem. Inst. Oswaldo Cruz*, **28**, 1.

HOARE, C. A. & COUTELEN, F. (1933). Essai de classification des trypanosomes des mammifères et de l'homme basée sur leurs caractères morphologiques et biologiques.—*Ann. Parasitol.*, **11**, 196.

KOFOID, C. A. & DONAT, F. (1933). South American trypanosomiasis of the human type—occurrence in mammals of the United States.—*California & Western Med.*, **38**, 1.

——. (1933a). Experimental infection with *Trypanosoma cruzi* from intestine of cone-nose bug, *Triatoma protracta*.—*Proc. Soc. Exp. Biol. & Med.*, **30**, 489.

—— & MCCULLOCH, I. (1916). On *Trypanosoma triatomae*, a new flagellate from a Hemipteran bug from the nest of the wood rat, *Neotoma fuscipes*.—*Univ. Calif. Publ. Zool.*, **16**, 113.

REICHENOW, E. (1928). Doflein's *Lehrbuch der Protozoenkunde*, 5 Aufl., II Teil (Jena).

TORRES, M. (1913). Molestia de "Carlos Chagas." Transmissão do *T. cruzi* pela picada da *T. megista* (Nota preliminar).—*Brazil Medico*, **27**, 321.

——. (1915). Alguns fatos que interessam á epidemiologia da molestia de Chagas.—*Mem. Inst. Oswaldo Cruz*, **7**, 120.

WENYON, C. M. (1926). Protozoology. A Manual for Medical Men, Veterinarians and Zoologists. Vol. 1. (London: Baillière, Tindall & Cox).

HELMINTHIASIS.

MAPLESTONE (P. A.). **Intestinal Helminth Infections found in India : the Laboratory Diagnosis and Treatment. Methods employed at the Calcutta School of Tropical Medicine.**—24 pp. With 2 plates. 1934. Bengal Govt. Press, Alipore, Bengal. Also **The Laboratory Diagnosis and the Treatment of Helminth Infections.**—*Indian Med. Gaz.* 1934. May. Vol. 69. No. 5. pp. 266–273. With 27 figs. on 2 plates.

The three parts of this paper describe the methods employed at the Calcutta School of Tropical Medicine for the laboratory diagnosis and treatment of the intestinal helminthic infections met with in India.

Part I. All modern concentrative methods used for the discovery of eggs depend on floatation. Of these the best is D.C.F. But for those without a centrifuge Willis's technique, performed with due attention to its limit of effective concentration and with half an hour's standing, is advised. It is recorded that though it was first published by WILLIS [this *Bulletin*, Vol. 19, p. 246] it was really devised by Maplestone and suggested to Willis by him. It is claimed that if no hookworm eggs are found " after the examination of a patient's stool on two different days it may safely be concluded that hookworms are not present in sufficient numbers to produce symptoms of disease."

Part II describes first the eggs which are found by the above technique (hookworm, fertile ascaris, trichuris, trichostrongylus, enterobius, heterodera, strongyloides, *Hymenolepis nana* and *H. diminuta*), and those which are not (unfertile ascaris eggs, those of *Taenia saginata* and *T. solium*, *Bertiella studeri*, *Fasciolopsis buskii*, *Gastrodiscus hominis*, *Paryphostomum sufrartyfex* and *Heterophyes heterophyes*).

Part III deals with those drugs which Maplestone has found the most effective. Regarding carbon tetrachloride it is noted that a considerable number of deaths from this drug have occurred in labour forces in India, some of which he attributes to the concomitant effects of alcohol, others to idiosyncrasy. Accordingly Maplestone has abandoned it. Tetrachlorethylene combined with oil of chenopodium [*ante*, p. 393] is the treatment advised for hookworm infection ; oil of chenopodium in three 10 minim doses in capsules at hourly intervals [2 cc. in all] for ascaris. Against trichuris his impression is that tetrachlorethylene is better than carbon tetrachloride. Trichostrongylus infection, it is stated without qualification, is never heavy enough to give rise to symptoms, but under tetrachlorethylene eggs have disappeared. For the tapeworms, carbon tetrachloride 3 cc. (ℳ 45) is advised, or, if contraindicated, 1 gm. (grains 15) of hexylresorcinol in hard gelatin capsules. Gentian violet has been tried for strongyloides without much success. Thymol is unmentioned, it being not stated whether it has not been tried or has been found wanting. *Clayton Lane.*

VAN DEN BERGHE (Louis). Une enquête helminthologique à l'école professionnelle de la Kafubu (Katanga). [**Helminthological Enquiry at the Medical School, Katanga.**]—*Ann. Soc. Belge de Méd. Trop.* 1934. June 30. Vol. 14. No. 2. pp. 193–197.

This helminthological enquiry places schistosomiasis as the most important helminthic infection in Katanga.

Faecal diagnosis was by 3 smears in normal saline and two preparations by a Willis technique in 183 inhabitants of villages close to the Northern Rhodesian border. The urine was centrifuged and all the deposit examined. The percentage findings in faeces were hookworms 64·5, ternidens 2·7, both these 1 ; strongyloides and trichuris one case of each ; ascaris was evidently absent ; taenia 3 cases, hymenolepis 1 case, *S. mansoni* 8 per cent., *S. haematobium* 2 per cent. In the urine *S. haematobium* ova were found in 73 cases (40 per cent.) and in view of the fact that albuminuria is relied on in laboratories to disclose this infection, it is noted that 22 of them had none. Moreover 11 more cases showed albumin, pus and red corpuscles in the urine but no ova. Both kinds of ova were found in the urine in 2 cases. Treatment of all infected persons led to no permanent reduction, owing doubtless to reinfection, and for this there is ample opportunity since *Limnaea natalensis, Physopsis africana* and *Planorbis adowensis* abound, the 2 last being carriers of schistosomiasis. The small canals swarm with planorbis, 200 being found in a length of one metre. Urinary infection is spreading rapidly from the Rhodesian boundary. The only feasible method of prevention is the adequate disposal of faeces by a means which should be adoptable in schools, colleges, and police lines. *C. L.*

MAURITIUS. **Annual Report of the Bacteriological Laboratory for the Year 1932** [ADAMS (A. R. D.), Pathologist and Superintendent]. 11 pp.

In the Annual Report for 1932 of the Bacteriological Laboratory, Mauritius, there are points of general interest.

In an excised appendix which displayed to the naked eye many apparent miliary tubercles, the microscope showed bilharzia ova as their cause. These, too, were found in an epithelioma of the cervix uteri, tartar emetic was given and 14 months later the amputation stump was healthy. Although miracidia of *S. haematobium* swarmed about 200 of each of *Limnaea mauritiana, Physa borbonica, Melania tuberculata, M. scabra* and *Paludina zonata,* in no case was penetration observed or infection established on dissection [see ADAMS p. 774]. A heavy untreated infection by *Plasmodium tenue* was observed twice daily for three days and over that period these forms were steadily but not completely replaced by rings, apparently of *P. falciparum. C. L.*

EGYPT, MINISTRY OF THE INTERIOR. DEPARTMENT OF PUBLIC HEALTH. **Research Institute and Endemic Diseases Hospital. Second Annual Report 1932** [KHALIL BEY (M.), Director].—38 pp. With 3 figs. on 2 plates. 1934. Cairo : Govt. Press. [P.T. 12.]

This report covers the activities, routine and experimental, of this Institute and Hospital during its second year, in the course of which it was inaugurated by King Fouad. Most of the experimental work has been published elsewhere and abstracted in this *Bulletin.*

Treatment by a mixture of carbon tetrachloride, ascaridole and K,1750 (a resorcinol derivative) was very disappointing for *A. duodenale* and *T. saginata,* gave good results for ascaris, and has the disadvantage of great bulk. Mosquitoes, both female and male, have been induced to feed on blood from a pipette, and it is hoped thus to determine the amount sucked in for a single meal. *Culex pipiens* was found naturally infected with microfilariae in a village in Shargiya

Province and breeding freely in wells. In the clinical report it is noted, first that of 2,279 persons who had 9 or more injections with fouadin 62·2 per cent. were cured of schistosomiasis after 9, 82·7 per cent. after 11, and 86·8 per cent. after 13 of these ; and second that in the treatment of pure ancylostome infection the dosage of carbon tetrachloride was 5 cc. in 30 cc. of water for a man of 60 kilos. Of 1,255 cases re-examined after one such treatment 50 per cent. were still infected to an unstated diagnostic technique. [At the risk of once again being dubbed "reactionary" and "prejudiced" the reviewer cannot escape the responsibility of pointing out that this percentage of disinfestation is considerably less than that given by particulated thymol ; while as to risk, the 19 deaths in 1,600,000 Egyptians reported by Tomb and Helmy after carbon tetrachloride [*ante*, p. 109] should be compared with no deaths in 1,600,000 persons treated by Ashford with thymol in Porto Rico.] *C. L.*

Russell (Paul F.). **Racial and Age-Group Incidence of Common Intestinal Helminths in the Straits Settlements.**—*Malayan Med. Jl.* 1934. Mar. Vol. 9. No. 1. pp. 17–22. With 5 figs.

Russell's conclusions based on the examinations of 27,000 stools by a direct gravity floatation technique are as follows :—

"The incidence of hookworm infection among Malays, Chinese and Indians alike in the Straits Settlements tends to become greater in the older age groups. The incidence of roundworm and whipworm infection, on the contrary, tends at first to rise but then to fall as the age increases, regardless of race.

"The incidence rates in all age groups for all three parasites are higher in Malays than in Chinese and Indians. Chinese have the lowest incidence rates in all age groups for hookworms and roundworms. But the incidence of whipworms tends to be significantly higher in the Chinese than in the Indians." *C. L.*

Giovanardi (Augusto) & Mondolfo (Ugo). L'elmintiasi in alcuni centri rurali della Romagna. Ricerche parassitologiche ed epidemiologiche. [**Helminth Infection in Rural Centres of the Romagna.**]—*Giorn. di Batteriol. e Immunol.* 1934. June. Vol. 12. No. 6. pp. 1121–1160. With 2 plans & 4 figs. [117 refs.] English summary.

An investigation in three rural centres near Romagna (south of the Po) gave the following results.

Faecal smears of 519 persons belonging to 114 families showed these percentages of infection : Ascaris 46, trichuris 7·68, enterobius 0·76, and taeniae 0·76. The ages most affected were 1 to 15, and women were more so than men. Privies are present but little used on account of their condition, so that there is much fouling of the surroundings of houses ; eggs of ascaris and trichuris have been found on the floors of and round privies and in domestic and school refuse (so that they may be conveyed by the feet of man and animals, on the hands of mothers and children, and on vegetables) but not in water or on flies. Attention is drawn to analogies in the epidemiology of helminthiasis and of typhoid, and the need for improving rural surroundings is urged.

C. L.

WIGAND (R.). Klinisch-parasitologische Beobachtungen. [**Clinical Parasitology.**]—*Deut. Med. Woch.* 1934. Mar. 30. Vol. 60. No. 13. pp. 461–464. With 3 figs. [13 refs.]

This investigation deals with 1,330 in-patients in East Prussia, namely 1,000 adults and 330 of 14 years or under.

Hydatid, hookworm, trichinella and strongyloides are absent or almost so, and thread worms are not necessarily discovered by faecal examination. The percentage of ascaris infection was highest in skin diseases, 13·3; respiratory diseases showed 9·4, and bacterial infections 8·8. The high incidence in skin diseases is associated by Wigand with the anaphylactic skin reactions which may accompany this infection, that of respiratory diseases with the larval pulmonary journey, and that of bacterial infections with the suggestion that the larvae act as " pacemakers " to bacteria ; but he notes that for the province there is an average ascaris infection of 30·2 per cent., and that any illness of the host which makes the worms ill results in their expulsion ; so that the more reasonable explanation surely is that a skin disease affects ascaris little, while a general infection with fever results in their early expulsion. Eosinophilia in worm infections was as variable as usual. In pernicious anaemia the liver of the burbot (Quappe, *Lota lota*) was efficacious in pernicious anaemia, judging by reticulocytes, haemoglobin and number of erythrocytes ; but owing to the possibility of causing infection with *Diphyllobothrium latum* it should never be eaten raw. Fouadin, given as KHALIL advises, proved useless against opisthorchis as judged by the findings of eggs in stool or by duodenal sound. *C. L.*

BRÜNING (H.). Eingeweidewürmer und ihre Bekämpfung. [**Intestinal Worms and their Control.**]—*Deut. Med. Woch.* 1934. Mar. 23. Vol. 60. No. 12. pp. 425–431.

A tabular description of intestinal worms and instructions for their treatment which need to be accepted with reservation. Thus, while it is said that the genital pores of the taeniae lie irregularly to the right or left side (seitlich), those of diphyllobothrium are said to lie on one side (seite) only. Of the hookworms, only *A. duodenale* is mentioned. The dosage of oil of chenopodium is stated in drops, although the size of a drop differs with the dropper and confusion between drops and minims has killed quite enough people already. The advised dose of thymol is 10–20 grams daily or say half an ounce on an average.

C. L.

CAMERON (Thomas W. M.). **Parasitic Diseases Common to Man and Animals.**—*Brit. Med. Jl.* 1934. June 23. pp. 1110–1112.

A general survey of some helminthic parasites of man. Those living as adults in man and animals are divided into " normal," namely, those forms sufficiently frequent in man to be so termed, and abnormal, those which are not. Among the second group which live as adults in man and as larvae in animals are placed *Taenia solium* and *Trichinella spiralis* ; while in the third, living as larvae in man and adults in animals fall hydatid disease and cercarial dermatitis. *C. L.*

Mönnig (H. O.). **Erratic Worm Parasites in Man.**—*South African Med. Jl.* 1934. July 14. Vol. 8. No. 13. pp. 475–476.

Mönnig points out that worm parasites have often to journey within the host before reaching their final habitat, and that in doing so they may stray.

There are instanced skin reactions allergic or otherwise (including creeping eruption); the usual habitats or wanderings of *F. hepatica*, *D. dendriticum*, *S. haematobium*, *C. cellulosae*, *A. lumbricoides*, *E. vermicularis*; and the author's findings of 126 segments of *Taenia saginata* in material removed from the frontal sinus of a girl suffering from persistent epistaxis. Prenatal infection is probably commoner than is at present suspected. *C. L.*

Fernandez (Fidel). Parasitismo intestinal y jugo gástrico. [**The Gastric Juice in Intestinal Parasitism.**]—*Medicina Países Cálidos.* Madrid. 1934. July. Vol. 7. No. 7. pp. 336–338.

Evolution of intestinal parasites occurs altogether independently of the chemical type of the gastric juice. In 60 cases of diarrhoea with protozoal or helminthic parasitism in the bowel, gastric acidity was excessive in 14, normal in 18, subnormal in 13, and absent in 15. The percentages of cases with normal or excessive acidity were for parasitized 53·3 and for non-parasitized 65·5; the corresponding figures for lessened or absent acidity being 46·6 and 34·5. *C. L.*

Girges (Rameses). **Helminthic Dyspepsia in Egypt.**—*Jl. Egyptian Med. Assoc.* 1934. Feb. Vol. 17. No. 2. pp. 208–218.

"It is a good counsel, when puzzled over some obscure dyspeptic condition in any patient, to bear intestinal worms in mind."

The factors concerned in producing helminthic dyspepsia are put as being toxins, anaemia, irritation and chronic inflammation of the stomach, intestinal catarrh and chronic nephrosis. The clinical manifestations are put as being derangement of appetite (excessive, deficient, odd, or perverted), effects of fasting and of thirst, sensory, motor and functional disturbances either connected or unconnected with meals, and vasomotor disturbances. *C. L.*

Eldin (M. Salah) & Hassan (A.). **Gastric Functions in Helminthic Infections.**—*Jl. Egyptian Med. Assoc.* 1933. July. Vol. 16. No. 7. pp. 735–752. With 14 figs. [13 refs.]

Ankylostomiasis and intestinal schistosomiasis were found responsible for variations in the gastric secretions.

In 40 unselected cases of helminthic infections, single and multiple, 71 fractional test meals were investigated. Of these cases 10 were normal, 8 showed hyperchlorhydria, 13 hypochlorhydria, 5 achlorhydria and 4 achylia. Apparently only 20 were retested after presumed expulsion of parasites; of these 4 had been and remained normal; of 4 that had shown hyperchlorhydria 3 returned to normal or high normal and one persisted as such, 4 hypochlorhydrics showed improvement, 3 achlorhydrics showed acid after expulsion, and 5 were deemed pellagroid and remained without acid. In view of Stewart's work [*ante*, p. 389] the question of pepsin will no doubt be considered in future, for the investigation continues. *C. L.*

FAKHRY (A.). **The Treatment of Schistosomiasis and Ankylostomiasis with Acriflavine.** [Correspondence.]—*Lancet.* 1934. July 21. pp. 162–163.

A preliminary note suggesting that acriflavine is useless against schistosomes but valuable against *Ancylostoma duodenale.*

Fakhry has treated 12 cases of schistosomiasis (11 *S. haematobium*, 1 *S. mansoni*) with acriflavine as advised by FISHER (see below) with benefit to symptoms but none to numbers and viability of ova when re-examination was made 3 days after the 5 daily doses ceased. By this time the urine has ceased to be coloured and presumably to be itself lethal to miracidia. Ten of the cases had also ancylostome eggs and in 8 of them eggs ceased to be found after the treatment; "so this gives a rate of 2 failures in 10 cases." [As Looss pointed out in Egypt, drugs, alcoholic excess and other changes in the worms' habitat cause oviposition of hookworms to cease for days. The results of re-examination after a stated and adequate interval will doubtless be reported when these preliminary experiments are repeated.] *C. L.*

CHOPRA (R. N.), GHOSH (N. N.) & MUKERJI (A. K.). **Anthelmintic Properties of *Vernonia anthelmintica* Willd. (Syn. *Serratula anthelmintica*).**—*Indian Jl. Med. Res.* 1934. July. Vol. 22. No. 1. pp. 183–186.

Vernonia anthelmintica is a tall annual, N.O. Compositae, found throughout India.

The seeds contain:—

"(*a*) About 18 per cent. of a fixed oil, (2) about 0·02 per cent. of an essential oil, (3) a bitter principle, and (4) resin, tannins, phlobaphenes, etc.

"(*b*) Powdered seeds in doses of 30 to 60 grains have a weak vermifugal action against ascaris and a more powerful action against oxyuris. The bitter substance isolated, in doses of 3 to 10 grains, has a weak vermifugal action against ascaris and a decided action against oxyuris. When combined with calomel and followed by magnesium sulphate the vermifugal action is considerably enhanced.

"(*c*) The drug has no action whatsoever against the hookworm and tapeworms.

"(*d*) The anthelmintic properties of the drug against ascaris and even against oxyuris are weaker and in no way comparable with some of the other compounds now in the British Pharmacopoeia." *C. L.*

ISHII (Yoshio). **Studies on the Development of *Fasciolopsis buski*. Part I. Development of the Eggs outside the Host. Part II. Morphology and Biology of the Miracidium. Part III. Development in the Intermediate Host of *Fasciolopsis buski*, and Ekcystation of the Encysted Cercaria.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1934. Mar. Vol. 33. No. 3 (348). [In Japanese pp. 349–378. With 1 text fig. & 19 figs. on 1 folding plate. [65 refs.]; 379–390. With 6 figs. on 1 plate; 391–412. With 29 figs. on 1 folding plate. English summaries pp. 29–32.]

A closely detailed and finely illustrated study of the development of *F. buskii* from egg to encysted cercaria.

For the many details the papers or their English abstracts should be consulted. Of more general interest is the report that the secretion of the cephalic gland of the miracidium dissolves the adjacent surface

of the snail into a small conical hollow, whose margin forms the "penetration ring" which serves as a holding point for further entry. Mother rediae appear in about 14 days, daughter rediae have escaped from these in 25, mature cercariae have been found in 30 days and have left the snail in 31–35, all figures apparently holding for 28°C. The encysted cercaria is freed, not by mere action of gastric and intestinal juice, but by the mechanical stimulation and higher temperature of the definitive host's alimentary canal, assisted by the presence of bile.

C. L.

Lièvre (Henri). Les distomatoses à *Fasciola hepatica*. [*F. hepatica* **Infection in Algeria.**] [Thesis for Doctorate of Medicine at University of Algiers. (1932. No. 22).]—291 pp. With 8 maps in text & 1 folding map. [472 refs.] 1932.

A valuable survey of the subject with special reference to the distribution of the infection in animals in Algeria, and with a survey of all cases, actual and problematic, which have been reported in man.

C. L.

Senevet (G.) & Lièvre (H.). La distomatose hépatique à *Fasciola hepatica*. [*F. hepatica* **Infection in Algeria.**]—Reprinted from *Algérie Méd.* 1933. Nov. 7 pp. [23 refs.]

Seven cases of this infection have been reported from Algeria while an eighth probably became infected there. Diagnosis, symptoms, treatment and prevention are dealt with. The mortality is believed to be 38 per cent.

C. L.

Bose (A. N.). **Preliminary Report on a Rare Helminthic (Gastrodiscus) Infection in Man.**—Reprinted from *Patna Jl. of Med.* 1934. Jan. Vol. 9. No. 1. pp. 26a–26b.

Two inhabitants of a village in the Bhagalpore District, Bihar, India, passed between them, after carbon tetrachloride and oil of chenopodium, over 200 specimens of *Fasciolopsis buskii* and a few *Gastrodiscus hominis*. Apparently others in the village are infected with the former at least.

C. L.

Binford (Chapman H.). **Clonorchiasis in Hawaii. Report of Cases in Natives of Hawaii.**—*Public Health Rep.* 1934. May 18. Vol. 49. No. 20. pp. 602–604. With 1 plate.

Clonorchis ova were found in all stool specimens of 4 lepers examined as a matter of routine. None of these had been outside the Territory of Hawaii and all had lived on the Island of Maui at some time or other.

Up to 1927, aliens with clonorchis infection were excluded from Hawaii, the condition being classified as a "loathsome and contagious disease," but since it had not spread to man in the United States or Hawaii the regulation was then relaxed. As to the human infection, it is pointed out that large quantities of frozen, dried, salted and pickled fish are imported into these islands, that Cyprinidae are known harbourers of this infection, and that two of the four infected persons had eaten raw goldfish (which belong to this family) caught in the artificial taro ponds. As to operculated snails, there are three native species of Melaniidae and perhaps *M. hongkongiensis* is a host of the fluke.

C. L.

BAGCHI (K. N.). **The Incidence of Clonorchis Infection in India.**—*Indian Med. Gaz.* 1934. June. Vol. 69. No. 6. pp. 318–320.

The diagnosis is based on the study of eggs in the faeces. A stunted male of 23, looking about 13, suffered from enlarged liver and spleen with anaemia (r.b.cs. 3,370,000, leucocytes 10,800, eosinophils 12, haemoglobin 45, colour index 0·67), irregular and intermittent fever, alternating constipation and diarrhoea, and a mild attack of jaundice a few months earlier. Used on 4 occasions D.C.F. showed no hookworm eggs, so that the possibility of this infection could safely be excluded, nor was there any evidence for malaria or kala azar. Brown operculated eggs were found on two out of four separate faecal examinations on different days and were very irregularly distributed in the faeces. Measurements of 3 eggs showed average dimensions of 27·6 by 15·9 μ. The eggs agreed in all respects with those obtained from a typical clonorchis case in Liverpool, and, although noting the difficulty in distinguishing them from those of heterophyes, Bagchi feels no hesitation in identifying the infection as clonorchis, presumably on the suggestive history and clinical findings. Since Indians seldom eat uncooked fish, the question is raised whether this infection, as well as that with *Fasciolopsis buskii*, might not be due to eating raw *Trapa bicornis* which is commonly peeled with the teeth. An editorial note dissents from the supposition that infection does not occur direct from fish and suggests that the evidence for clonorchis infection is not at all conclusive. *C. L.*

HOEPPLI (R.). **Histological Changes in the Liver of Sixty-Six Chinese infected with *Clonorchis sinensis*.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1125–1141. With 10 figs. on 5 plates. [11 refs.]

This study brings yet another helminthic infection into the list of those in which, with symptoms absent or at most slight, the amount of bodily damage is indeed considerable.

In all 66 cases the infection was accidentally discovered at autopsy and had apparently in no case been the cause of death; which had for the most part been sudden and in 27 had not resulted from disease. For each of them there is provided a brief note of the cause of death and of the histological changes found. In all of them the larger bile ducts were dilated, and their walls thickened by new fibrous tissue which in 49 cases extended into the lobules. In 2 there was definite cirrhosis, in one constituting an exaggerated and advanced form of that present in the other cases, but in the other being Laennec's form. In a few there was dilatation and thickening of ducts too small for the flukes to have entered. Stress is laid on the adenomatous character of the epithelial proliferation present in the ducts and on the varying shapes of these cells. The liver cells showed fatty change in 20 cases. Cellular infiltration predominantly lymphocytic was the rule, in one case to the extent of forming lymphoid follicles with germinal centres. In 37 there were eosinophils in very varying numbers, and in 9 changes in the blood vessels—hyalinization of new fibrous tissue round central veins in 5, and increased fibrosis often with hyalinization of the arterial intima in 4. The reproduced microphotographs are excellent. *C. L.*

Uyeno (Hiroshi). Ueber pathologisch-histologische Veränderungen der Kaninchenniere bei experimenteller Clonorchiasis sinensis. [**Changes in Rabbit Kidney in Experimental Clonorchiasis.**]—*Okayama-Igakkai-Zasshi* (*Mitt. d. Med. Gesellsch. z. Okayama*). 1934. Apr. Vol. 46. No. 4. pp. 794–801. [14 refs.] [In Japanese. German summary p. 793.]

In clonorchis-infected rabbits the splitting up of uric acid by the kidney is greatly lessened as compared with the condition in the uninfected.

C. L.

Ameel (Donald J.). **Paragonimus, its Life History and Distribution in North America and its Taxonomy (Trematoda : Troglotrematidae).**—*Amer. Jl. Hyg.* 1934. Mar. Vol. 19. No. 2. pp. 279–317. With 101 figs. on 6 plates. [42 refs.]

The author summarizes thus :—

" All stages of the life history of the lung fluke of mammals in North America have been worked out in detail. The usual mammalian host is the mink. The second intermediate host is various species of crayfishes of the genus *Cambarus*. The snail host is *Pomatiopsis lapidaria*. All four generations in the snail have been reared in experimentally infected snails. The sporocyst and first generation redia of *Paragonimus* have been described in detail for the first time. The two redial generations have been distinguished on a structural basis. Hitherto undescribed morphological structures are reported for the miracidium, first and second generation rediae, unemerged cercaria, emerged cercaria and metacercaria. The knowledge concerning the distribution of the lung fluke of mammals in North America has been considerably enlarged. Sufficient evidence has been presented to indicate that the cuticular spines of the adult may not be good criteria for species differentiation. It has been suggested that characters more suitable for this purpose may be found in the life history stages but that, to be of value, it would be necessary to work out the life history in many endemic areas. The size of the gut in the second generation redia was pointed out as the one difference between the lung flukes of North America and Asia." *C. L.*

Nagayoshi (K.). **On the Present Incidence of Paragonimiasis in an Aborigines Village in Shinchiku Prefecture.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1934. Apr. Vol. 33. No. 4 (349). [In Japanese. English summary p. 56.]

The present incidence of paragonimiasis in this endemic area in Formosa was 4 of 17 boys and 2 of 15 girls examined. The habit of eating raw crabs is still prevalent. *C. L.*

South African Medical Journal. 1934. May 12. Vol. 8. No. 9. pp. 319–325. **A Symposium on Bilharziasis. I. Helminthology** [Mönnig (H. O.)]. pp. 319–320 ; **II. The Pathology of South African Bilharziasis** [Pijper (A.)]. pp. 320–321 ; **III. The Signs and Symptoms of Bilharziasis** [Epstein (B.)]. pp. 321–323. **IV. The Treatment of Bilharziasis** [Wronsley (W. H. Lloyd)]. p. 323 ; **V. Bilharzia and the School** [Kieser (J. A.)]. pp. 323–325 ; **VI. Prevention of Urinary Bilharziasis in the Union** [Cluver (E. H.)]. p. 325.

Mönnig deals with the systematic position of the species and their development. As to *Schistosoma bovis* he cites the Iraq work of MacHattie and his collaborators and urges further work, particularly by infection of a snail with a single miracidium from man and another

with a single miracidium from an animal. Since only one sex results from one miracidium, animal experiments would shortly determine whether the two mated and produced fertile offspring. He suggests that "schistosomiasis" should take the place of "bilharziasis," because under the Rules of Zoological Nomenclature the parasites' valid name at the moment is *Schistosoma*. [But there is no reason why the nomenclature of disease should be changed because that of zoology alters. Trichinosis, for example, needs no modification.]

PIJPER makes it clear that in South Africa he has never seen *S. mansoni*, but ova of *S. haematobium* are found in an ever increasing number of appendices submitted to the laboratory, and he raises this question—If there are symptoms of chronic appendicitis and the blood test reveals bilharzial infection, is it justifiable to substitute tartar emetic for operation? Similarly these eggs have been found in diseased tubes and even uteri. He notes that in these appendicular and tubal cases the urine has contained no ova. Reaction to the eggs may be intense, as evidenced in a case in which, with many ova, nearly the whole pelvis was filled with granulation tissue. In most adults the damage is held to amount to little more than a periodic loss of blood [but *cf.* BLACKIE, this *Bulletin*, Vol. 29, p. 401] though in children it is a grave matter and most local cases occur in the young. In diagnostic search of urine for ova it is advised to digest the centrifugal deposit with antiformin and again centrifuge; while the search of stool smears is usually fruitless so that some concentrative method has to be employed, Pijper preferring Telemann's. He has been using an antigen made from heavily infected urines "with reasonably good results," and reports a case with the ova in the sputum.

EPSTEIN uses the literature in describing the symptoms and he too stresses the frequency in South Africa of bilharzial appendicitis, acute and chronic in European and native.

WRONSLEY describes briefly treatment with tarter emetic, fouadin and emetine.

KIESER, a layman, gives a most valuable and graphic account of the effects of infection as seen in the school. As to the pupils it shows itself in 3 ways, in mentality, in physical retardation, and in stamina. His own words cannot be bettered :—

(*a*) *Mentality.*—"Johnny X comes to school at the age of 7 years, is a very promising and bright little boy, passes on very rapidly up to Standard II or III, and is generally placed among the first five scholars of his class until he becomes infected with Bilharzia. He then gradually becomes lazy, indolent, and his school-work deteriorates, and he drops several notches in the class, and probably scrapes through his Standard III by the skin of his teeth, but becomes a hopeless failure in Standard IV, to the great distress of his parents and his teachers. When such a case-history is presented to you, it is imperative to search for Bilharzia as a possible cause of the gradual retardation, even if there is no history of haematuria and the possibility of infection is denied. In all cases of this nature a cure of the bilharziasis has re-established the child on his previous pinnacle of eminence, to the great surprise of the teachers and sometimes—but seldom—to the gratitude of the parents."

(*b*) *Physical Retardation.*—"Boy over 10 years, still in grades; weight 46 lbs. Class teacher's report: 'He is too dull and lazy to do anything; he is not even naughty—just sits down wherever you put him and doesn't do anything.' Was injected and cured, and on re-examination three months later the following was found: (*a*) had gained 30 lbs. in weight, (*b*) was promoted to Standard I on merit, had become very active, and had already had several canings for naughtiness."

(*c*) *Loss of Stamina.*—" Boy of 15 nearly always fell out at cadet drill after about 10 minutes, complaining of all sorts of vague pains, and although he denied suffering from bilharziasis, his urine contained ova. He was injected and cured ; later on gave no more trouble at drill."

The incidence of infection runs as high as 60 per cent. As to the teacher, here too the most striking aberration is loss of memory and inability to concentrate, and after cure he is apt to throw away as useless the notebooks he had to use while actively infected.

Cluver, for prevention, lays most stress on treatment. Since an infected snail seldom lives for a year, cure, or alternatively prevention of promiscuous urination, would cut out further infection within about a year. The proper use of latrines will follow only after long education. A survey of water collections is necessary, with marking of all pools proved infective. Clean swimming pools must be provided. Suspected streams and pools must be cleared of vegetation to starve snails and stocked with trout or other snail-eating fish, and in them ducks and other snail-eating water fowl must be encouraged or protected. Chlorination does not kill cercariae, but for water of swimming pools a concentration of 1 lb. of copper sulphate in 100,000 gallons of water will do so within 48 hours.

A discussion followed in which Roseman stressed Haslam's report connecting irrigation with the spread of schistosomiasis (this *Bulletin*, Vol. 27, p. 173). *C. L.*

Bulletin de l'Office International d'Hygiène Publique. 1934. May. Vol. 26. No 5. pp. 904–907.—Méthodes récentes à employer dans le problème de la bilharziose, avec remarques sur les régions irriguées de la province du Nil Bleu du Soudan Anglo-Egyptien. (Note du Dr. E. Fridie, communiquée au Comité permanent de l'Office International d'Hygiène publique, dans sa session d'octobre 1933, par M. le Dr. O. F. H. Atkey.) [**Schistosomiasis in the Irrigated Part of the Blue Nile Province, A.-E. Sudan.**]

Recounts the large amount of success attending measures to protect and free the Gezira Province from bilharziasis.

The paper deals more precisely with and brings information to a later date than Humphreys (this *Bulletin*, Vol. 30, p. 207). At the quarantine stations on the White Nile there were stopped between 1928 and 1932 over 14,000 persons. In the Province of Dongola during the same period the numbers examined yearly rose steadily from 12,203 to 49,007 while the percentages of infected were respectively 18, 12, 9, 4·6 and 5 ; examinations of school children from four different places show a like fall of infection. The indigenous population of the Gezira has over the same period shown infection figures of 0·46, 0·81, 0·21, 0·75, and 0·61. In it the protective measures have been provision of deep latrines, periodic drying and chemical disinfection of canals, and the provision of expert Bulinus hunters. *C. L.*

Zavattari (Edoardo). Sulla grande frequenza della schistosomiasi vescicale nel Fezzan. [**The Prevalence of Urinary Schistosomiasis in the Fezzan.**]—Reprinted from *Boll. d. Soc. Med.-Chirurg. Pavia.* 1934. Vol. 12. No. 2. 11 pp. With 2 figs.

The author during a residence in the Fezzan, Tripolitania, set himself the task, first of examining as many pools of water as he could to

determine the presence of Bulinus (Planorbis and rectal schistosomiasis do not occur), and, second, of examining the inhabitants for infestation by *S. haematobium*.

Local details are given for Bulinus intensity, which varies from abundance to absence; and fluke infection has been proved for 60 to 80 per cent. of boys in some localities and 15 to 20 per cent. of adults, though it, too, seems to be patchy. *H. H. S.*

Cawston (F. G.). **The Control of Schistosomiasis in South Africa.**—*Jl. Roy. Army Med. Corps.* 1934. Aug. Vol. 63. No. 2. pp. 110–112.

When antimonium potassium tartrate was first introduced for intravenous injection it contained lead and other impurities. The consequent ill effects were attributed to the drug itself, it fell into disuse, and the sodium salt and fouadin, its sodium equivalent, were largely substituted; though at the South African Institute for Veterinary Research the potassium salt and antimosan, its potassium equivalent, were retained in use. Cawston believes that the intravenous administration of the potassium salt should be confined to those able to administer it without undesirable local or general disorder. Nevertheless, high altitude seems to predispose to shoulder pain after injection. Treatment should aim at destroying the more resistant male parasite. There is no authority in the Union which is concerned with the control of *P. africana*, the usual local disseminator of schistosomiasis. *C. L.*

Adams (A. R. D.). **Studies on Bilharzia in Mauritius. I. The Experimental Infection of** *Bulinus* (*Pyrgophysa*) *forskali* **with** *Schistosoma haematobium*.—*Ann. Trop. Med. & Parasit.* 1934. July 12. Vol. 28. No. 2. pp. 195–204. [15 refs.]

This would appear to be the first occasion in which *Bulinus* (*Pyrgophysa*) *forskali* has been shown conclusively to act as a host of *Schistosoma haematobium*.

Of all the Mauritian snails tested (and they included *Lymnaea mauritiana*, *Physa borbonica*, *Gyraulus mauritianus* and *Melanoides tuberculata*), *B.* (*P.*) *forskali* was the only one vigorously attacked by the miracidia of *S. haematobium*. When the miracidia were numerous (10,000 to 20,000) the snails were literally covered with them and died with as many as 30 miracidia in a single low power field in sections subsequently made. All soft parts were penetrated, though no miracidia were observed in the tentacles. This snail, even when uninfected, could not be kept alive in a tank, but when a concrete open drain was used with a gentle current (conditions similar to those on which it lives naturally on the island), bifid-tailed cercariae began to emerge in 28 days from infected snails.

"In short, 100 *forskali* selected at random and dissected were all infested with characteristic sporocysts and cercariae; and in addition to these specimens actually dissected a large number of other snails of the same species were found to be emitting infective larvae. Dissection of about 50 specimens of each of the other species of snail exposed to the same treatment failed to reveal any such infestation. Control dissection of all types of snail had not shown the presence of the infection before the experiments had been commenced." The cercariae

had the morphological characters of the human schistosome cercariae. The wide distribution in Africa of this snail is pointed out and its omission from serious consideration in lists of possible intermediate hosts is commented upon. Animal experiments are in progress and will duly be reported. *C. L.*

Diamantis (A.). Le cancer bilharzien vésical. A propos de 11 cas personnels dont 2 cas de cancer bilharzien vésical non infecté. [**Bilharzial Cancer of the Bladder.**]—*Jl. Egyptian Med. Assoc.* 1934. June. Vol. 17. No. 6. pp. 563–583. With 2 figs.

The conclusion reached is that with a bladder wall more or less filled with calcareous bilharzial deposits the irritation of a fresh infection produces cancer, so that this calcification has the same relation to vesical cancer as has leucoplasia to cancer of the tongue. The term " non infecté " appears to apply to bacteria. *C. L.*

El Diwany (Moh. Abdel Monem). **The Bilharzial Appendix.**—*Jl. Egyptian Med. Assoc.* 1934. Mar. Vol. 17. No. 3. pp. 285–295. With 6 figs.

"I am sure that one can find in the out-patients of any [? Egyptian] hospital hundreds of cases of chronic appendicitis for operation, if one takes the trouble to examine patients thoroughly."

Actually the author reports 25 cases of which 8 were negative to smear examination before operation, while after it " more thorough methods " displayed 3 more positives. *C. L.*

Erspamer (Vittorio). Ricerche ematologiche sulla Schistosomiasi vescicale. (Ricerche compiute nel Fezzàn.) [**Blood Researches in Vesical Schistosomiasis, Fezzàn.**]—*Haematologica.* Pavia. 1934. Vol. 15. No. 7. pp. 633–644. [24 refs.] French summary.

Twelve cases of bilharzial bladder were studied.

Anaemia was inconstant and if present hypochromic or with normal haemoglobin value. Leucocytosis was or was not present, but polymorphs were reduced at the expense of eosinophils and of mononuclears rather than of lymphocytes. *C. L.*

Fisher (A. C.). **The Treatment of Schistosomiasis with Acriflavine.**—*Lancet.* 1934. Apr. 28. p. 897.

The results of acriflavine treatment in 52 intestinal cases were promising.

Having found that acriflavine was lethal in high dilutions to bilharzial cercariae in the presence of human blood serum, Fisher gave the drug to patients at Yakusu, Haut Congo Belge, by mouth (in all but the first two cases) in doses lessening relatively as weight increased, thus : 20 kg. or less, 0·02 gm. per kg. ; to 30 kg. 0·015 gm. per kg. ; 60 kg. 0·01 per kg. with a maximum dose of 0·7 gm. In 13, ova continued unchanged in the faeces ; of these 11 were small children and received a dose of 0·012 gm. per kg. All the other 39 cases became symptom-free in less than 3 days, all ova passed after a week being degenerate. The longest observation period was 2 months. There have been no toxic symptoms or unpleasant sequelae. The parasite is described as being " of the *haematobium-bovis* group." *C. L.*

CHRISTOPHERSON (J. B.) & WARD (R. Ogier). **Bilharzia Disease in England : the Cystoscopic Appearance of the Bilharzia Bladder before and after Intravenous Injections of Sodium Antimony Tartrate.**—Reprinted from *Brit. Jl. Surgery.* 1934. Vol. 21. No. 84. pp. 632–636. With 2 coloured figs.

A case of infection with *S. haematobium* acquired in Southern Rhodesia, and recognized and treated in England.

Treatment was by sodium antimony tartrate. Coloured figures of the cystoscopic appearances before and after this illustrate the condition. Christopherson's advice is to reach 2 grain doses in 4 days by daily administrations and thereafter to give 2 or 2½ grains on alternate days so that 28 to 30 grains may be reached in 4 or 5 weeks, the intention being that the flukes shall not become drug fast. Three points are stressed. After treatment small round yellow vesicles persisted, standing out on a normal vesical mucosa ; they are believed to be due to dead ova. Eosinophilia may reach 70 per cent., it increases as injections persist, but if present after 3 months points to lack of cure. The distressing cough and discomfort in the throat and chest experienced immediately after an injection may be alleviated or abolished by giving ¼ grain of omnopon intramuscularly 10 minutes before the antimony, and this may perhaps have been the reason that the man escaped the alarming muscular pains which may accompany tartrate injections.

C. L.

BRATIGNY (Jean). Contribution à l'étude des bilharzioses : leur importance en Afrique du Nord. [**Schistosomiasis, Particularly in N. Africa.**] [Thesis : University of Algiers.]—101 pp. [17 pages of refs.]

A survey of general knowledge of schistosomiasis, with particular reference to North Africa. *C. L.*

FAUST (Ernest Carroll) ; HOFFMAN (William A.) ; JONES (Charles A.). **Life History of Manson's Blood Fluke** (*Schistosoma mansoni*). **I. Extramammalian Phase of the Cycle** [FAUST & HOFFMAN].—*Proc. Soc. Experim. Biol. & Med.* 1934. Jan. Vol. 31. No. 4. pp. 474–476. **II. The Mammalian Phase of the Cycle** [FAUST, JONES & HOFFMAN].—*Ibid.* pp. 476–478 ; **III. The Blood Picture in Schistosomiasis mansoni** [FAUST & JONES].—*Ibid.* pp. 478–479.

The findings of these summarized researches are indicated by the titles. They took place in Porto Rico.

I. Egg numbers vary day by day as well as with the age of the infection. Hatching of a mature miracidium is influenced by its vitality, by toxicity of the medium and by agitation, and usually requires 12 to 24 hours after washing the stool. The miracidia then live for not over, usually for considerably less than, 24 hours in the top inch of the water. Of *Helisoma* (*Planorbina*) *guadaloupense* exposed to infection by them, 75 to 100 per cent. become infected. Primary sporocysts were first identified on the eighth day. Cercariae begin to emerge in from 24 to 35 days according to season, continue to do so for 4 months with greatest daily discharge at about 2 months, and about 100,000 are so produced from a single miracidium. The infection makes the snail unusually liable to die from other causes. The cercariae emerge commonly between 9 a.m. and 1 p.m. and are uniformly

distributed through the water in 8–10 hours; after 18–24 hours they usually crawl about the bottom, they avoid cold but are capable of surviving for at least 24 hours at a temperature just above freezing, and are then activated on raising it to 22°–30°C. They have two pairs of anterior secretory (penetration) glands with large dense granules, and four pairs of posterior secretory glands with fine granules. In a small percentage of specimens freshly emerged from the snail, evidence of a head gland has been found.

II. In Porto Rico man is the only known definitive host. The methods of research are stated. With important exceptions the lines of development are those already described. Within 16–20 hours the cercariae have left the skin of experimental animals. They reach the right heart mainly by veins, to some extent by lymphatics having passed through the lymph nodes, and are found in the lung capillaries in 20 hours. By the third day they have reached the systematic circulation and by the fourth the portal branches within the liver where, it is believed, they feed for the first time. The fact that fed larvae are found in the lungs up to the 19th day is evidently held as evidence that they have returned to the right heart from the liver. The conception is that of a series of passive conveyances of larvae by the blood circulation through the various organs but with an accumulation in the liver about the 13th day. In no single instance was there evidence of direct active migration of larvae from pulmonary vessels to liver. As compared to *S. japonicum*, *S. mansoni* has a lag of 5 to 10 days. Some individuals are mature in 35 to 40 days. The habitat is the colonic venules. There is usually only one egg in the uterus, but 8 per cent. of 355 females had three. Yet from egg counts in the mucosa each female is believed to lay several tens of eggs daily, only a small fraction being evacuated with the faeces.

III. While the pulmonary circuit is occurring there is a leucocytosis. In the latent period there is a leucopenia and if there is eosinophilia it occurs at its end. From about the 40th day the plasma holds excess of euglobulin. "Moderate to late clinical cases usually give a positive precipitation test for serum globulin." Erythrocyte numbers are little altered but are evidently being formed in excess, as evidenced by hyperplastic bone marrow and reticulocytosis. *C. L.*

Hoffman (William A.) & Faust (Ernest Carroll). **Studies on Schistosomiasis mansoni in Puerto Rico. II. The Epidemiology and Geographical Distribution of Schistosomiasis mansoni in Puerto Rico. I. Epidemiology of the Infection on the Island.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1934. Mar. Vol. 9. No. 3. pp. 228–254. With 1 text fig. & 12 figs. (1 map) on 7 plates. [10 refs.] [Spanish version pp. 255–282.]

Here are considered the geography and climate of Porto Rico, its chief agricultural product (sugar cane), methods of obtaining local epidemiological data, known foci, and the habits of intermediate and definitive hosts which favour infection.

The smear does not reveal this infection with certainty and to do so reliance seems to have been placed on straining with gravity precipitation (see below), though Faust states that he has employed straining and centrifugal precipitation. In diagnosis stress is laid throughout on a history of piquiña, or intense itching, as serving to display those waters immersion of the skin in which has permitted

cercariae of this fluke to penetrate it. [The reviewer suggests that an unhesitating assumption that piquiña means penetration of schistosome cercariae is unwise in view of the production of intense bathing rashes by other cercariae in the United States and in Europe (Cort, this *Bulletin*, Vol. 25, p. 946; Christenson & Greene, Vol. 27, p. 459; Matheson; Mathias; Vogel; Taylor & Baylis, Vol. 27, pp. 960 & 961) and by hookworms in Porto Rico itself (Ashford, Payne & Payne, *ante*, pp. 122 & 391.]

The intermediate host, *Helisoma* (*Planorbina*) *guadaloupense*, has been studied with avowed incompleteness as to habits and habitat, but the following considerations are believed to hold good. There is a decided preference for quiet water, though the snails have been observed to move against a moderately strong current; they are, then, adaptable creatures. In places where they thrive the water has always been alkaline with pH of 7·2 to 7·8; they have been found in water so brackish as to taste salty; and they flourish in limestone pools where many reach the maximum diameter of the species, namely 1·25 in., but it is noteworthy that in these " limestone sinks " no infected snails have ever been found. Drying is harmful to these snails although the matter has not been measured in terms of time, nor is it known whether they can save themselves by burrowing into mud. Heavy rain will wash them away either to destruction or to some quiet overflow pool where they may spread infection. *H. guadaloupense* is far wider spread than is human schistosomiasis, so that the slow spread of the disease which is believed to be taking place in Porto Rico is likely to continue; but on the other hand the disease is present where none of these snails has been found; yet when they have been found it has sometimes been in quite unexpected spots. Promiscuous defaecation is a main factor in spreading infection to snails, but sewage is run into streams or directly on to cane fields. Cercariae enter man when he is bathing, washing clothes (though a swift current and soap seem to be deterrents), wading, fishing, and working as at irrigation ditches for the cane. A girl under 2 years old was the youngest infected person found, a local infection of 60 per cent. was discovered, and a good social status does not protect children who swim in infected waters. The paper also contains much of purely local interest. *C. L.*

Hoffman (W. A.), Pons (J. A.) & Janer (J. L.). **The Sedimentation-Concentration Method in Schistosomiasis mansoni.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1934. Mar. Vol. 9. No. 3. pp. 283–291. [Spanish version pp. 292–298.]

Since Mansonian schistosomiasis is of importance in Porto Rico, and since the usual faecal smear does not display all infections, the authors have devised and evaluated a concentrative method which uses straining and gravity precipitation.

Experience has resulted in alteration in detail but the method now advised seems to be as follows. 1 gm. of faeces is softened in 2 oz. of water for 15 to 20 minutes. If the water is tap water it should first have been allowed to stand until bubbles have formed and broken. The faeces are then comminuted and the suspension strained rapidly through an 80 to 100 mesh sieve or several thicknesses of cheesecloth. It is then left to sediment, apparently for as long as is judged necessary, in a conical urine glass, it being noted [as for hookworm eggs and larvae] that ova are apt to come to rest on its sloping sides, but may be

induced to continue their way to the point of the cone by tapping the flask or, it is stated, by gentle stirring of its contents. To enable a Stoll's pipette to reach the bottom of the vase half the vessel's contents are carefully decanted, or a long conical pipette may be used. From the bottom of the glass 0·075 cc. is removed, placed on a slide, covered with a square 22 mm. cover and the eggs counted. Comparative counts of 35 smears and 35 of these preparations showed an average of 30 times as many ova from the latter as from the former, the figures varying from 1 to 1, to 0 to 204. To take 0·075 cc. from the sediment does not exhaust the eggs. The technique differs from that advised by Stoll in that water is used instead of decinormal caustic soda. "This chemical [which dissolves chitinoid] at times seemed to adversely affect schistosome ova. The number of eggs recovered, as a rule, did not exceed those found on smear preparations. . . Therefore it appears that the Stoll count possesses no appreciable advantage over the smear." Eggs began to lessen after the 4th injection of fouadin, but the ratio of dead to viable eggs appeared to remain unchanged, suggesting that the drug acts not on the eggs but on the mother worm. These tests must not be considered exactly quantitative, it is noted, for undoubtedly the point of the pipette does not always sample the part of the sediment which is richest in eggs.

[The authors first believed that sedimentation had not yet been used for schistosome eggs, but later found some references. They add "The procedure of Helmy apparently bears some similarity to that developed by the present authors, but owing to the inaccessibility of his publication, a detailed comparison cannot be made." Tomb and Helmy gave particulars of such a method in the *Trans. Roy. Soc. Trop. Med. & Hyg.*, 1931, Vol. 25, p. 181, and in the last list of "Exchanges" of that Society appears the *Puerto Rico Journal of Public Health & Tropical Medicine*. The paper itself was abstracted in this *Bulletin*, Vol. 29, p. 410.] *C. L.*

Lutz (Adolpho). Transmission du *Schistosoma mansoni* dans l'État de Minas Geraes (Brésil) par le *Planorbis centimetralis*. [**Transmission of** *S. mansoni* **by** *P. centimetralis* **in Brazil.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. pp. 1149–1150.

This short note, presumably a preliminary one, states that Lutz has observed miracidia hatching from the eggs of *S. mansoni* and infecting the small *Planorbis centimetralis* which is apt to escape attention among the much larger *P. olivaceus*. Some of these have survived long enough for the formation of cercariae and one of them has actually furnished cercariae which have infected 3 white mice, all the worms being males in the two hosts examined. *C. L.*

Legendre (F. M. A.) & Razafinjato. Note sur quelques cas de bilharziose à *Schistosomum mansoni*. [**Cases of Rectal Schistosomiasis (Madagascar).**]—*Bull. Soc. Path. Exot.* 1934. Apr. 11. Vol. 27. No. 4. pp. 398–400.

Eight cases are published as a reminder that particularly about Ambositra (Madagascar) this infection is present, and that in enteritis and dysentery the stools should be examined and an adequate course of tartar emetic given if necessary. *C. L.*

HUAI-CHIEH (Kan) & YUNG-TSUNG (Yao). **Some Notes on the Anti-Schistosomiasis Japonica Campaign in Chih-Huai-Pan, Kaihua, Chekiang.**—*Chinese Med. Jl.* 1934. Apr. Vol. 48. No. 4. pp. 323–336. [19 refs.]

This report has been issued before most of the patients had received a full course of treatment. Diagnosis and prevention are more adequately considered.

In diagnosis the smear, Tomb and Helmy's sedimentation method [this *Bulletin*, Vol. 29, p. 410], and Faust and Meleney's concentration method [this *Bulletin*, Vol. 22, p. 468] were compared and as a result the smear gave the highest incidence. But at least 8 smears were examined. [The conclusion emerges that these particular concentration methods result in marked loss of ova.] Local infective rates of oncomelania snails lay between 2·1 and 3·7 per cent., and experiments suggested that as a habitat they preferred weak faecal emulsion to grass infusion or to plain water. Local prophylactic measures are suggested. As to treatment, 22 had completed a course with fouadin, none with sodium antimony tartrate and 2 with emetine. Preference is given to fouadin with a cure rate of 68 per cent. *C. L.*

BHALERAO (G. D.). **On the Occurrence of *Schistosoma japonicum* Katsurada in India.**—*Indian Jl. Vet. Sci. & Animal Husbandry.* 1934. June. Vol. 4. Pt. 2. pp. 148–151. With 1 fig.

Some 6 male schistosomes obtained by MAPLESTONE from the intestine of a pig in Calcutta and received in a poor state of preservation are identified as *S. japonicum* and with this is correlated the report by SEWELL (*Records Indian Museum.* 1919, Vol. 16, p. 425) of cercariae resembling those of this fluke in *Indo-planorbis exustus* and *Limnaea amygdalum* from the same locality. It is held likely that future investigation will reveal this parasite in man. *C. L.*

LEE (C. U.) & CHUNG (Huei-lan). **Treatment of Schistosomiasis Japonica with Fouadin in Man.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1411–1420. [16 refs.]

Fouadin did not prove successful in Japanese schistosomiasis.

Four cases were treated. A boy of 11 derived no apparent benefit after 31 cc. in 14 days. The others, all adults, showed temporary improvement, with relapse in a non-endemic area; one received 31·5 cc. on 18 days when the drug had to be stopped on account of fever, headache, nausea, vomiting and prostration; another had 2 courses of 40·5 cc. and 45 cc. within 2 months; the last received 44·5 cc. intramuscularly in 18 days. *C. L.*

BROWNE (J. A.). **Notes on a Case of Schistosomiasis Japonica treated with "Fouadin."**—*Jl. Roy. Nav. Med. Serv.* 1934. Apr. Vol. 20. No. 2. pp. 182–183.

After 6 courses of fouadin—of 45 cc. for the first and apparently for the others—this officer was judged to have been cured. The infection was obtained while snipe shooting in spite of his going out smeared with carbolized vaseline and scrubbing himself with strong lysol on his return.

C. L.

Chung (Huei-lan). **Certain Surgical Complications of Schistosomiasis japonica.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1171–1180. With 2 plates. [14 refs.]

In these 4 cases, Japonic schistosomiasis was not suspected. The conditions calling for surgical interference were: mesenteric thrombus, retroperitoneal abscess, acute appendicitis with abscess, and tuberculosis of intestine and lungs. *C. L.*

Sonoda (Taro). Experimentelle Untersuchung ueber den Einfluss des Ikterus auf die Entwicklung von Schistosoma japonicum im Wirtskörper. (II. Mitteilung.) [**Influence of Jaundice in the Host on Development of** *S. japonicum*.]—*Trans. Soc. Path. Japon.* 1933. Vol. 23. pp. 820–822.

The development of *S. japonicum* is hindered in jaundiced rabbits at least in its later stages. In early jaundice the worms can come to full development. *C. L.*

Watanabe (Masumi). Ueber die Embryonalentwicklung von Schistosoma japonicum. [**Embryonic Development of** *S. japonicum*.]—*Okayama-Igakkai-Zasshi* (*Mitt. d. Med. Gesellsch. z. Okayama*). 1934. Mar. Vol. 46. No. 3. pp. 617–664. With 26 figs. on 5 plates & 5 text figs. [29 refs.] [In Japanese. German summary pp. 615–617.]

Watanabe describes in detail the development of *S. japonicum* from the single cell to the miracidium. *C. L.*

Meggitt (F. J.). **The Theory of Host Specificity as applied to Cestodes.**—*Ann. Trop. Med. & Parasit.* 1934. Mar. 29. Vol. 28. No. 1. pp. 99–105. [38 refs.]

Meggitt deals with an extension of the idea of the setting up of species, in this instance cestode species, on physiological grounds—namely the suggestion of Fuhrmann that any species to be a species must be limited to a single group of hosts. *Dipylidium caninum* or *Hymenolepis diminuta* would not, that is, be of the same species in man and in dog or rodent.

It is pointed out that there are two courses open. Either the anatomy is the deciding factor, or no identification of a worm is possible without knowing the host it came from. It is held that "the only safe procedure is to proceed to identification solely on the basis of the anatomy of the specimens . . . irrespective of the systematic position of the host."

[When the progeny of *Ancylostoma braziliense* from a cat in Brazil successively infect a sailor, a pariah dog in Colombo and a coolie on a Ceylon tea garden, what is their valid name at each stage if Meggitt's advice is thrown out?] *C. L.*

Sokolovski (W.). [**Transduodenal Expulsion of Cestodes with Quinine.**]—*Milit. Med. Ztschr.* Leningrad. 1933. Vol. 4. No. 4. pp. 274–276. [In Russian.]

The author obtained excellent results in the expulsion of cestodes with quinine [? hydrochloride] administered through the duodenal sound, in dose of 1 gm. in 10 per cent. alcoholic solution, followed 5 minutes later by administration of 15 cc. of a 25 per cent. solution of magnesium sulphate. This method was tested in 11 cases (9 *T.*

saginata, 1 *T. solium*, 1 *D. latum*) and was successful in 10, the worms having been expelled together with the scolices within 30–60 minutes. In the majority of the cases treated with quinine previous treatment with male fern was ineffective. *C. A. Hoare.*

Bransburg (M.), Gorelik (S.) & Schichobalowa (N.). Prüfung des Filicilens—eines neuen Mittels zur Behandlung der Zestodosen beim Menschen. [**Trial of Filicilen for Treatment of Cestodes.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1933. Vol. 2. Nos. 4–5. pp. 317–322. [In Russian. German summary p. 322.]

"Filicilen" was tested on 171 cases of cestode infection and proved to be effective in about 90 per cent. of infections with *T. saginata*, *T. solium*, and *D. latum*. The advantages of the new drug are its solubility in water and oil, its laxative properties and relative non-toxicity. This new anthelmintic is prepared from the extract of male fern and contains all its active principles without the ballast substances. The drug is made up either in powder form (1 part of which is equivalent to 2 parts of male fern extract), or dissolved in castor oil (1 part of the solution being equivalent to 1 part of male fern extract).

C. A. Hoare.

Mittelmann (G.). Zestodosen-Behandlung mit Cucurbita-Samen. [**Treatment of Cestode Infestation with Pumpkin Seeds.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1933. Vol. 2. No. 3. pp. 143–146. [In Russian. German summary p. 146.]

The treatment with pumpkin seeds resulted in the expulsion of the parasites in at least 55 per cent. of cases. It is recommended for its simplicity, cheapness and perfect harmlessness. *C. A. Hoare.*

Joyeux (C.), Houdemer (E.) & Baer (J.). Recherches sur la biologie des *Sparganum* et l'étiologie de la sparganose oculaire. [**The Biology of Sparganum and the Etiology of Ocular Sparganosis.**]—*Bull. Soc. Path. Exot.* 1934. Jan. 10. Vol. 27. No. 1. pp. 70–78. With 1 fig.

Since it is difficult to distinguish between the strobiles of *Dibothriocephalus mansoni* and *D. erinacei europaei*, the authors have attempted to discover differences in their development.

Their investigation started with the assumption that plerocercoids harboured by the snake *Tropidonotus natrix persa* of Italy will be those of *D. erinacei europaei*, while those harboured by *Tropidonotus piscator quinconciatus* of Indo-China will be of *D. mansoni*; and their conclusion is that the former develops easily in batrachians but does not develop in reptiles and mammals. In those cases in which parallel experiments were made the tables show, however, that for *Rana esculenta* the respective figures for the two forms were 8 of ten, and "about half"; for *Hyla arborea* 2 of 3, and "about half"; for *Testudo ibera* 2 of 4, and "nearly all"; for the white rat 1 in 5, and 1 in 6 or 8; for the guineapig 1 in 7, and 0 in 6 or 8; for the rabbit 1 in 2, and 0 in 6 or 8; and for the cat and dog negative results in both. Ocular sparganosis of the Far East is, the authors note, a matter of frog poultices and not of tapeworm species, for they have obtained identical experimental results by placing in the conjunctival sac the plerocercoids of both forms and those of *D.*

latum. Mention is made of 6 species into which FAUST and his colleagues divided *S. mansoni* in which connexion the findings of IWATA (below) should be taken into consideration. *C. L.*

IWATA (Seishun). **Some Experimental and Morphological Studies on the Post-Embryonal Development of Manson's Tapeworm** *Diphyllobothrium erinacei* **(Rudolphi).**—Reprinted from *Japanese Jl. Zool.* 1933. Oct. 20. Vol. 5. No. 2. pp. 209–247. With 54 figs. (14 on 4 plates). [60 refs.]

MEGGITT, FAUST and others have divided Manson's tapeworm into 7 species. Iwata's investigations show but one.

One and the same strobile showed proglottids corresponding in morphology to the seven different " species "—namely from the scolex caudad in regular sequence *D. reptans*, *D. okumurai*, *D. mansoni*, *D. ranarum*, *D. mansoni* (reappearance), *D. decipiens*, *D. houghtoni*, *D. erinacei*. There is then one species only, and since *D. erinacei* (Rudolphi, 1819) was the first of these names to be given, it is the valid name under the International Code of Zoological Nomenclature. The same conclusion follows feeding experiments, for the same adult worm has grown from plerocercoids obtained from frog, snake, weasel, hedgehog and man. *C. L.*

TARASSOW (Wictor). Das Schwein und der Hund als endgültige Träger des *Diphyllobothrium latum*. (Eine experimentelle Untersuchung.) [**Pig and Dog as Definitive Hosts of** *D. latum*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. Apr. Vol. 38. No. 4. pp. 156–159.

Pig and dog are definitive hosts of *D. latum* and may be so to an extent important in hygiene.

Contrary to the experience of MAGATH and ESSEX (this *Bulletin*, Vol. 29, p. 49) that only 1·5 per cent. of eggs of *D. latum* from the dog develop active coracidia Tarassow has found that 50 per cent. do so. Certainly development is slower than in the case of eggs from man, for in these about three-quarters were found developed to that stage from the 16th day onwards, whereas in those from the dog only 7·8 to 9·2 were so developed on the 16th day, but 50 to 52·1 per cent. showed coracidia on the twenty-fifth day. In these circumstances it is impossible to neglect the dog in any campaign against this parasite. Further Tarassow fed six plerocercoids from the pike to a pig of 1½ months old, and another of 35 days and took 6 himself. The numbers of strobiles which developed were two in each instance. Further he investigated 2 to 6 swine in each of 4 villages and found infection percentages of 100, 83, 33 and 0, the last being one in which fish did not form an article of food, so that the swine ate no fish offal. *C. L.*

SCHWENNICKE (Helmuth). Ein besonderer Fall von *Bothriocephalus latus*-Intoxikation. [**Case of** *D. latum* **Infestation.**]—*Muench. Med. Woch.* 1934. Jan. 19. Vol. 81. No. 3. pp. 96–97.

A woman of 53 with abdominal pain and distension and with vomiting and subicteric tinge of the skin and conjunctivae was sent into hospital for biliary colic. Expectant treatment was adopted and, a stool examination on the 13th day having disclosed " worm eggs," male fern produced about 8 metres of tapeworm with return to health and loss of the yellow tinge,

which had, however, never appeared in the urine. There was no eosinophilia; the leucocytes numbered 11,300. Such attacks had come on quarterly for 4 years. *C. L.*

YOSHINO (K.). **On the Subjective Symptoms caused by the Parasitism of *Taenia solium* and its Development in Man.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1934. Jan. Vol. 33. No. 1 (346). [In Japanese pp. 183–194. [16 refs.] English summary pp. 14–15.]

Yoshino swallowed 3 *Cysticercus cellulosae* and noted the following occurrences over about 2 years and 3 months. Either 2 or 3 strobiles grew. After reaching maturity, which in Japanese and Chinese takes 62 to 72 days, the number of gravid segments passed was 334 in the first month, 174 in the sixth, and 126 in the twelfth. This number therefore is no index of the number of worms harboured. The subjective symptoms vary with individual and worm load, a healthy man having few, and these being gastro-intestinal and more marked early. *C. L.*

YOSHINO (K.). **On the Evacuation of Eggs from the Detached Gravid Proglottids of *Taenia solium* and on the Structure of its Eggs.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1934. Jan. Vol. 33. No. 1 (346). pp. 47–58. With 8 figs. on 1 plate. [11 refs.] [In Japanese. English summary pp. 3–4.]

As the detached proglottid creeps about eggs are discharged from its anterior end, the average number so discharged being 40,436, while 876 remain. If discharged in water the eggs are complete, if not the onchosphere is naked. A detailed description with measurements follows. The hooks number 6 to 18. *C. L.*

ANDERSON (Marlowe G.). **The Validity of *Taenia confusa* Ward, 1896.**—*Jl. Parasitology.* 1934. June. Vol. 20. No. 4. pp. 207–218. With 34 figs. on 4 plates. [10 refs.]

The conclusion is that the name *Taenia confusa* lapses as a synonym of *T. saginata.*

The basis of the investigation is the following quotation from PARKER and HASWELL'S Text Book of Zoology :—

"... the only criterion of a 'good species' is usually the presence of constant differences from allied species. ... If there are no intermediate gradations between two sets of individuals, they will be placed without hesitation in distinct species: if, on the other hand, there is a complete series of gradations between them they will be considered to form a single variable species."

Since the descriptions of the four specimens of *T. confusa* are in many respects similar to those of *T. saginata*, Anderson examined 41 well preserved specimens of the latter. The ranges of variation in shape and size of organs and structures are tabulated, described and figured, and they include all the characters which have been described as specific for *T. confusa*, with a complete series of intergrading forms. There are not, then, two species. Anderson must be congratulated on a fine piece of laborious work. *C. L.*

Dévé (F.). " L'anatoxine hydatique " de Ymaz Apphatie ne possède pas de propriétés curatives à l'égard de l'échinococcose expérimentale. [**The Hydatid Anatoxin of Apphatie not Curative.**]—*C. R. Soc. Biol.* 1934. Vol. 115. No. 9. pp. 954–956.

In 1932 Apphatie reported the production of hydatid anatoxin by formalization of hydatid fluid at 39°C. for 1 month. Repeated injections of anatoxin in sufficient dosage were regarded as possessing immunizing powers and, in the case of two patients harbouring hydatid cysts, retrogressive changes, which were verified microscopically, were described as resulting from such inoculations. [See this *Bulletin*, Vol. 30, p. 681.]

The present paper deals with a few experimental observations on this subject. In the first experiment two mice were injected with the hydatid scolices derived from ovine sources. Six months later both animals received 14 injections of anatoxin, but subsequently at autopsy healthy cysts were found. Some 3 weeks after scolices had been inoculated into three other mice, injections of anatoxin were begun, a total of 13·2, 11·4 and 11·6 cc. being given. Four months later normally developing cysts were found. Similar results were obtained with experimentally infected rabbits.

Dévé concludes that his experimental results were entirely negative, and that the changes noted in cysts at operation on man by Apphatie were a coincidence and not causally related to anatoxin inoculation.

N. Hamilton Fairley.

Dévé (F.). Essai d'immunisation anti-échinococcique par injections sous-cutanées de membranes hydatiques broyées à l'état frais. [**Attempt to immunize against Hydatid by Injection of Pulverized Hydatid Membrane.**]—*C. R. Soc. Biol.* 1934. Vol. 115. No. 10. pp. 1025–1026.

In 4 white mice and 2 rabbits injections of pulverized fresh hydatid membrane had no effect in preventing or curing hydatid infection. *C. L.*

Ch'in (Kuang-yu). **Nodules or Tumors in Subcutaneous and Other Tissues due to** *Cysticercus cellulosae*.—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1181–1190. With 8 figs. on 4 plates.

A brief clinico-pathological note on 13 cases of *C. cellulosae*.

They occurred among 26,300 surgical specimens received in the pathological laboratory of the Peiping Union Medical College. The clinical diagnoses were : neurofibroma 4, sebaceous cyst 1, fibroma 1, lipoma 1, ganglion of biceps tendon 1, tumour of muscle 1, brain tumour 1, ? disorder of reticular system 1, cysticercus 2. The sites from which the tumours were removed were : subcutaneous tissue 8, muscle 3, brain 1, submucous layer of lip 1 ; nevertheless there were epileptic symptoms in 5. The microscopic appearances of cysts and tissues are described as well as symptoms, signs, and geographical distribution. As to the mode of infection, none admitted eating raw or underdone pork. Two harboured tapeworms. Of the other 11, stool examinations were made in 8 and were negative ; and none of them, all men of education and intelligence, had ever noticed passing anything like a tapeworm. Accordingly it is suggested that they

swallowed the onchospheres deposited on vegetables or fruit, in confirmation of which it is noted that they were also passing ascaris ova and amoebic cysts. *C. L.*

TULL (J. C.) & SUBRAHMANYAM (C.). **A Case of *Cysticercus cellulosae* of the Brain.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Aug. 4. Vol. 28. No. 2. pp. 165–166.

A case published because of the rarity of the worm, adult or larval, in Singapore.

Of 894,316 carcasses of pigs examined, 3,630 have been condemned for cysticercus infection ; stool examinations of 118,723 persons have disclosed *Taenia solium* in 6 only ; in 1,178 complete autopsies only one example of *Cysticercus cellulosae* has been found. The man now reported on had been admitted for prolapsed piles, but had suffered for 3 years from increasingly frequent epileptiform fits with loss of consciousness. His stools showed no ova nor segments of *T. solium*. His temperature suddenly rose to 104°F. with twitchings and aphasia. After death numerous dead uncalcified cysticercal cysts were found on and in the cerebrum and one in the cerebellum. *C. L.*

i. MARSH (E. B.). **An Interesting Case of Cysticercosis.**—*Jl. Roy. Army Med. Corps.* 1934. Apr. Vol. 62. No. 4. pp. 294–296.
ii. HOLMES (F.). **Notes on a Case of Cysticercosis.**—*Ibid.* pp. 296–298.

i. Cysticerci limited to the brain.

Marsh has seen 10 cases of cysticercosis invalided for epilepsy within 18 months. Headache, fever, insanity and stupor, with double optic neuritis but no vomiting, were the cardinal symptoms of this case. At autopsy, very many cysticerci throughout and over both hemispheres with a few in the mid-brain constituted the parasitic findings, with no strobilus, nor was there a history of one.

ii. Holmes's case had passed segments for 3 years, and under *Filix mas* passed a *T. solium*. He was a dispatch rider with temporary disorientation of time and space followed by epileptic fits, in which the tongue was bitten, and accompanied by subcutaneous nodules shown to be caused by *Cysticercus cellulosae*. *C. L.*

DIXON (H. B. F.) & SMITHERS (D. W.). **A Case of Cysticercosis (*T. solium*) with Well-Marked Optic Neuritis.**—*Jl. Roy. Army Med. Corps.* 1934. June. Vol. 62. No. 6. pp. 426–430.

The now usual history of service in India and epileptic fits, with optic neuritis beginning when in the Army in June 1931.

A Board in February 1933 reported no subcutaneous nodules ; at one in 1934 it was found that 28 had appeared. The optic neuritis had practically disappeared leaving secondary atrophy without lessening of the fields.

C. L.

i. DENNY-BROWN (D.). **Cerebral Cysticercosis with Epilepsy.**—*Proc. Roy. Soc. Med.* 1934. Apr. Vol. 27. No. 6. pp. 667–668 (Sect. of Neurology pp. 19–20).
ii. BEHRMAN (S.). **Cysticercosis.**—*Ibid.* pp. 668–669 (Sect. of Neurology pp. 20–21). With 1 fig.

Both men had been in India and suffered from fits.

i. X-rays showed calcified cysts above the tentorium, very numerous, superficial and deep, up to the size of a pin's head, but none elsewhere. Pallor of both discs.

ii. He had harboured a tapeworm, as had two other soldiers in the same regiment who also had subsequent fits. There were numerous calcified cysts in muscles (some shown in a reproduced skiagram) and brain.

C. L.

Dudley (Sheldon F.). **Tape Worm Cysticercus Epilepsy as illustrated by a Case in a Naval Rating.**—*Jl. Roy. Nav. Med. Serv.* 1934. Apr. Vol. 20. No. 2. pp. 179–181.

The case of a naval rating is used to bring MacArthur's experience in the Army to the notice of Naval surgeons.

A man of 40 had his first fit at Hong Kong after 20 years service and passed tapeworm segments on the way home. *T. solium* was evacuated at the R. N. hospital, X-rays showed calcified cysts about elbow and legs, and the type of seizure was very variable. *C. L.*

Hoeppli (R.) & Feng (L. C.). **Myeloid Changes in the Spleen of Experimental Animals due to Infection with *Cysticercus fasciolaris* and to Emulsions prepared from Tapeworms.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1146–1153. With 3 figs. on 2 plates.

Definite myeloid changes in the spleen may be obtained by infection of rats and mice with *C. fasciolaris* and by injecting emulsions of *C. fasciolaris*, *Taenia taeniaeformis* (the former's strobile) and *T. marginata*.

The authors have found in the literature no reference to any influence of *C. fasciolaris* on it. Hamsters are largely, or perhaps entirely, immune to this change. *C. L.*

Brumpt (E.), Duvoir (M. E.) & Sainton (J.). Un cas de cénurose humaine dû au " Coenurus serialis " parasite habituel des lapins et des lièvres. [**Case of Human Coenurosis due to *C. serialis* of Hares and Rabbits.**]—*Bull. Acad. Méd.* 1934. July 10. 98th Year. 3rd. Ser. Vol. 112. No. 26. pp. 58–67. With 5 figs. [15 refs.]

The specific identification of *Coenurus serialis* is based on the morphology of the scolex, the habitat, and the presence of pedunculated exogenous daughter cysts and of free endogenous ones.

In a woman who finally died of cirrhosis of the liver, there were present coenurus cysts in 3 sites: the left thigh, the right subscapular region, and the right iliac region. They had been noticed for about 6 months. The first was removed under a local anaesthetic from between the fibres of the quadriceps, but in doing so its contents were lost. The others were examined after death. The subscapular tumour contained 15 cc. of fluid, measured 70 by 40 mm., possessed seven islets of scolices, 463 in all, 3 external ramified, pedunculated and extremely motile daughter cysts, and 19 vesicular internal ones, all daughter cysts being without scolices. The iliac cyst measured 30 by 20 mm., contained 2 cc. of fluid and appeared to consist only of 50 daughter cysts measuring 1 to 6 mm. across, of various shapes, and with numerous scolices in various stages of development. The normal scolex showed 4 suckers and two circles of 16 hooklets each, the large measuring 130 to 150 μ and the small 90 to 105 μ, the only anomaly being one head without its circle of large hooks. The four other human coenurus cases are noted with their references, the other of *C. serialis* being by Bonnal, Joyeux & Bosch (*ante*, p. 120). *C. L.*

KUTSCHINSKY (W.). Ueber Dehelminthisation bei Hymenolepidosis mit Osarsol. [**Treatment of *H. nana* Infestation with Osarsol.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1933 Vol. 2. No. 3. pp. 151–154. [In Russian. German summary p. 154.]

The author describes the treatment of *Hymenolepis nana* infections with two tablets of osarsol (=stovarsol), twice daily for 3 days. In five cases described in some detail the treatment resulted in the temporary absence of ova from the faeces during about 4 months in 2 cases, and in their complete disappearance in 3 cases. *C. A. Hoare.*

SCHWENNICKE (Helmuth). Helminthiasis oder Hernia epigastrica? [**Helminth or Epigastric Hernia?**]—*Muench. Med. Woch.* 1934. July 13. Vol. 81. No. 28. pp. 1048–1049.

The answer is—A tapeworm.

A girl of 14 had a median swelling as large as a cherry between xiphoid and navel, disappearing on pressure and returning when this was relaxed, pressure being painful. Laparotomy revealed no hernial sac, nor was any opening of such found from the peritoneal side. She passed some segments of tapeworm later and, after *Filix mas*, a head which is unarmed. *C. L.*

HSÜ (H. F.). **Remarks on Some Morphological Characters of Parasitic Nematodes of Man and Dog together with Description of a New Goezia Species from Yangtze Beaked Sturgeon.**—*Chinese Med. Jl.* 1934. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1289–1297. With 7 figs. on 1 plate. [26 refs.]

Two parasites of man are included, *Ternidens deminutus* and *Enterobius vermicularis*.

T. deminutus possesses a gubernaculum, narrow and thick anteriorly, broad and thin posteriorly, leaf-shaped in ventral view with its base cephalad and measuring 0·107 mm. long by 0·053 mm. broad.

E. vermicularis.—After recording views by 4 helminthologists from 1926 onwards that the male possesses 5 pairs of caudal papillae, Hsü adds "I come to the conclusion that there are actually six pairs of caudal papillae in the male specimens of *E. vermicularis* and that the old description given by LEUCKART is perfectly correct. Modern investigators have usually overlooked the small pair of sessile papillae which are situated lateral to the most anterior pair of the pedunculated papillae." [His drawing closely confirms that of the reviewer: BYAM & ARCHIBALD'S *The Practice of Medicine in the Tropics*, 1923, Vol. 3, p. 1877, fig. 644B.] *C. L.*

LI (H. C.). **Feeding Experiments on Representatives of Ascaroidea and Oxyuroidea.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1336–1342.

The worms investigated feed essentially on the intestinal contents of the host, though damage to the intestinal wall is possible.

Hosts of *Toxocara canis*, *Toxascaris leonina*, *Ascaridia lineata*, and *Heterakis gallinae* were fed on charcoal and those of *A. lineata* on starch, and there was examination of the contents of *A. lumbricoides* from man. In the last case its intestine was opened and part of the contents embedded in paraffin and sectioned; in 9 specimens these contents could not be identified, in the tenth two ascaris eggs and some striated muscle were found. *C. L.*

Niño (Flavio L.). Miositis verminosa. (Consideraciones diagnósticas y parasitológicas.) (Nota previa.) [**Verminous Myositis.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1933. Vol. 9. Nos. 79, 80 & 81. pp. 346–348. With 5 figs.

A nematode in the dorsal muscles caused a chronic interstitial myositis. A countryman of 63 had a tumour in the back on the level of the left shoulder, taken to be a sarcoma. Section of the specimen showed a nematode lying between the muscular bundles and having a transverse diameter of 0·2 to 0·5 mm. with a chitinoid surface, a muscular coat, 2 uteri, and an alimentary canal. Parts were cretified. Round it was an interstitial myositis with giant cells. *C. L.*

Töppich (G.). Nematodenbefunde im Gehirn bei Pellagra. [**Nematodes in the Brain in Case of Pellagra.**]—*Deut. Med. Woch.* 1934. June 1. Vol. 60. No. 22. pp. 814–817. With 5 figs.

In a woman diagnosed as dying from pellagra, two nematodes were found in the brain.

She suffered from mental depression and confusion, was emaciated and pale, and in her brain were found two nematodes; one a male in the cerebrospinal fluid within the ventricle in the frontal region just visible to the naked eye, and another smaller (and judged to be young on the ground that no cuticle could be found) behind the chiasma. It is pointed out that this find does not constitute evidence that pellagra is the result of a nematode infection. [There is no mention of skin eruption.] *C. L.*

Otto (G. F.) & Cort (W. W.). **The Distribution and Epidemiology of Human Ascariasis in the United States.**—*Amer. Jl. Hyg.* 1934. May. Vol. 19. No. 3. pp. 657–712. With 1 map. [51 refs.]

This paper summarizes published and unpublished information on the ascaris problem in the United States.

Much of it has, then, already been abstracted in this *Bulletin*. The noteworthy points of more than local importance seem to be as follows. Endemic centres are the Appalachian Mountains and their foothills, south central Louisiana, south eastern N. Carolina and Tampa in Florida. In the Appalachians, and in ascaris families elsewhere dwelling in areas otherwise worm-free, there is pollution of the immediate surroundings of the house; elsewhere faeces are deposited at some distance from the house. In the Louisiana area a clay soil is kept damp by a high water table, and in the Carolina areas most ascaris families live close to swampy land. In treated populations the original level of infection is regained within 8 months (so that treatment without sanitation is unavailing) while children in a sanitary orphanage have lost infection in 13 months. When the resources of the family hardly suffice for food and clothing, they will not be used for sanitary improvement, particularly in places where many families have not used or even seen a privy for generations and where the school has an open-backed dirty latrine or none at all. The schools must have first class sanitary arrangements suitable for children's use. "The whole process will probably take generations" [as Stiles has insisted for years]. *C. L.*

Otto (G. F.) & Cort (W. W.). **Further Studies on Post-Treatment Reinfection with Ascaris in the United States.**—*Jl. Parasitology.* 1934. June. Vol. 20. No. 4. pp. 245–247.

Post-treatment reinfection was rapid, widespread and intensive. Treatment was by varying doses of hexylresorcinol in nearly 300

children. Taking the ascaris-infected which were re-examined, the percentages positive 2 to 3 weeks, 5 months and 8 months after treatment were 52, 78 and 85; the average numbers of eggs per cc. of faeces before treatment, and at these same intervals after it, were for the positive cases 23,000, 10,600, 21,800 and 38,700, and for the whole number, positive or negative, 23,000, 5,500, 17,100 and 33,000. The authors point out the futility of attempting to control ascaris infection by treatment alone. [Indeed the number of eggs, that is the risk to the community, was increased by some 50 per cent. after and presumably as a result of treatment.] *C. L.*

GIRGES (Rameses). **Studies on Ascariasis. I.—Geographical Distribution: with Special Reference to Egypt. II.—Endemiology.**—*Jl. Trop. Med. & Hyg.* 1934. Mar. 15. & Apr. 16. Vol. 37. Nos. 6 & 8. pp. 85–90; 114–119.

The first part of this paper points out that in Upper Egypt the incidence of ascariasis ranges from 0·7 to 3 per cent. rarely reaching 8 to 10 per cent., whereas in Lower Egypt it affects about half the population. The cause of this great difference is held to be the fact that vegetables in Upper Egypt are never manured, as they are in lower Egypt, with night soil, so that the link between food and ova is cut off. Moreover Upper Egyptians derive their water from the river or wells, Lower Egyptians from contaminated canal water. A list of percentages of infection collected from world-wide literature follows. Indebtedness to this *Bulletin* is acknowledged.

The second part considers the literature, as displaying the non-identity of human and porcine ascaris; the conditions favouring growth —namely climate, season, temperature, humidity, light, soil, oxygen, altitude, and pH; modes of transmission by wind, insects, unconscious coprophagia including vegetables, fruit and drinking water, and direct infection, which term is here restricted to swallowing ova from dirty hands; the factors promoting dissemination of ova including promiscuous defaecation and manuring with nightsoil; modes of infection by mouth, skin, nasal mucosa, through the placenta and breast; factors promoting infection, namely fecundity of the worm, infectivity of the egg, resistance of ova and larvae and their longevity. *C. L.*

GIRGES (Rameses). **Studies on Ascaris. III.—Aetiology and Prophylaxis.**—*Jl. Trop. Med. & Hyg.* 1934. June 1. Vol. 37. No. 11. pp. 162–166.

Aetiology.—"For an individual to be infected, embryonated eggs should arrive in his alimentary tract in water or food," and in this connexion some stress is laid on geophagy. The infection is considered under age, sex where women are held to be more liable than men to be geophagists, residence especially town dwelling, occupation with almost equal affection of all classes though infection is very rife among those working on the soil, crowding, eating uncooked vegetables, avitaminosis, and dirty habits.

Prophylaxis.—For the intracorporeal stage there is mass treatment, and, for the extracorporeal, substitution of the use of latrines for promiscuous defaecation, the change to be effected by propaganda through pamphlet, schools, and religious teaching, by the removal of praying places from the banks of canals since defaecation must be followed and prayer preceded, by washing and there is a general

tendency to make one washing cover both objects, by reformation of villages and their latrines, and by the avoidance of unboiled or unfiltered water and of raw vegetables. The difficulties in attainment are pointed out. As to treatment the advantages of worming the whole population once or twice a year are stated. The fact that there is no cheap and safe sanitary privy is stressed. The showing by STILES that a privy may have a radius of influence for evil is put side by side with the opinion of OTTO that any privy regularly used will effectively control ascaris infection. The very name for nightsoil used by the fellaheen (rismal, that is stock or capital) shows the difficulty inherent in its sanitary disposal, in which connexion the possibilities and limitations of the septic tank are considered ; and the last sentence reads " One should endeavour to combat geophagy and all perversions of taste in children and degenerates." *C. L.*

GIRGES (Rameses). **Pathogenic Factors in Ascariasis.**—*Jl. Trop. Med. & Hyg.* 1934. July 16. Vol. 37. No. 14. pp. 209–214.

A survey of the literature under the heads of toxins, and of irritative and inflammatory, traumatic, bacteriferous, mechanical and migratory actions. *C. L.*

LIÈVRE (H.). A propos de l'hématophagie des *Ascaris*. [**Haematophagia of Ascaris.**]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. p. 1079.

It is held that ascarids do not normally feed on blood.

Finding of iron in the intestinal cells, as reported by ASKANAZY, may merely mean that it has been obtained from animal food. BRUMPT has found no evidence of ecchymosis or congestion of the intestinal mucosa in numerous autopsies of those infected. Lièvre has ground up in water the intestines of ascaris of man and pig, *A. megalocephala* of the horse and *Toxocara canis* of the dog, reduced haemoglobin in the supernatant fluid by potash, and examined by spectroscope for haemochromogen. This was present in 75 per cent. of intestines but the quantity was so small as to be logically attributable to the fleshy food of the animal. [The paper does not disclose the particular animal on which the horse is believed to have fed.] *C. L.*

STEWART (F. H.). **A Method of incubating Ascaris Eggs.**—*Indian Jl. Med. Res.* 1934. July. Vol. 22. No. 1. p. 1.

A method is described for securing the three requisites for development of ascaris eggs—a moist atmosphere, a temperature of 25°C. and clean surroundings. From 2-inch lengths of the ascarid uterus the eggs are pressed out under water, the eggs from 2 or 3 such sections are transferred to a test tube containing $1\frac{1}{2}$ inches of water and evenly suspended by vigorous shaking of the corked tube. The tube is held horizontally and slowly and evenly rotated on its axis. The inside of the tube becomes coated with a uniform layer of eggs.

" It is the outer albuminous coat which causes the egg to adhere. When the greater number have thus adhered the tube is turned upright ; the water collects at the lower end leaving the eggs in air which is kept moist by the corking of the tube. The tubes are kept at room temperature in the summer or in a low temperature incubator at about 25°C. If the contents become at all foul the water should be changed with a pipette. Under these conditions the eggs segment and develop steadily until each

contains an active embryo. Samples can be taken out at intervals on the point of a scalpel and examined in water, and finally the whole cylinder of ripe eggs can be scraped out on the edge of a knife." *C. L.*

MOMMA (Kenji). **Agglutinative Action of Normal Blood Serum on Granules in Vas deferens of Ascarids.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. July. Vol. 38. No. 7. pp. 273–282. With 5 figs. [17 refs.]

A new serological test fails to find any difference between ascaris of man and pig.

In 1929 Momma accidentally discovered that the granules in the lower part of the vas deferens of ascarids [presumably the spermatozoa] were agglutinated by sera from man, dog, rabbit and cat; and that when this had reached a saturation point the supernatant fluid, obtained by centrifuging, no longer agglutinated these granules. Then becoming aware of YOSHIDA's work (1928) showing that human spermatozoa coming into contact with human serum absorbed specifically a similar agglutinin, he set to work to discover whether sera in contact with pig and human ascaris granules become similarly saturated. He found that they did and adds, " these experimental results are able to offer a new ground for the identity of both species." *C. L.*

ESSED (W. F. R.) & VAN THIEL (P. H.). Een merkwaardige vorm van ascaris-eieren. [**A Curious Form of Ascaris Egg.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. Apr. 24. Vol. 74. No. 9. pp. 551–552. With 4 figs. on 1 plate.

The appearance as of an operculum in some unfertile ascaris eggs is noted.

A patient in Soerabaja was treated twice with *Filix mas* (the duodenal sound being used on one occasion) in the belief that he harboured *Diphyllobothrium latum.* The eggs were, however, atypical unfertile ascaris eggs, the shell at the pole (or poles) being so thinned as to give the appearance of an operculum. It is pointed out that in one of the microphotographs illustrating a paper by FÜLLEBORN (this *Bulletin*, Vol. 29, p. 751) an indication of an effect of this kind is visible. *C. L.*

WANG (K. C.). **The Treatment of Ascariasis with Hexylresorcinol.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1433–1437.

After strict starvation 1 gm. of hexylresorcinol was followed by 30 cc. of a 50 per cent. solution of magnesium sulphate and stools were examined 11, 12 and 13 days after treatment. All three examinations were negative to an unstated technique in 78·4 per cent. of cases.

" It has been our experience that cases resistant to a first treatment of hexylresorcinol are resistant to all forms of treatment, as most of the 16 cases with positive stools after treatment from this series required more than two courses of different drugs to get a cure. In a few instances hexylresorcinol was repeated as the second course. Of these [the] majority remained . . . positive, and a third course was given, chenopodium or santonin being substituted.

" In only two of the 74 cases treated with hexylresorcinol have symptoms been complained of. In the first case anorexia lasting several days occurred, but this cleared up without treatment. In the second case abdominal pain and diarrhoea were produced and lasted one day." *C. L.*

Liotier (Raymond). Sub-occlusion intestinale par peloton d'ascaris.—[**Intestinal Subocclusion by a Mass of Ascaris.**]—*Marseille-Méd.* 1934. Mar. 15. Vol. 71. No. 8. pp. 364–366. With 1 fig.

In a child of four, a mass of 30 ascarids formed a knot in the ileum close to the ileocaecal valve visible through the intestinal wall at an operation undertaken for colic and pain about McBurney's point. The mass was removed by transverse enterotomy. *C. L.*

Albert (Jose) & Paulino (Peregrino H.). **Report on Some Instructive Cases of Heavy Ascariasis.**—*Jl. Philippine Islands Med. Assoc.* 1934. July. Vol. 14. No. 7. pp. 269–270.

Three fatal cases are described.

Two of these have already been reported to the Manila Medical Society. They died of intestinal obstruction from ascarids. The third, a boy of 8, died of meningitis with jaundice, probably haemolytic, with 235 adult ascarids in the bowel. *C. L.*

i. Hodgman (J. H.). **Ankylostomiasis on the Gold Mines of the Witwatersrand.**—*Irish Jl. Med. Sci.* 1934. May. 6th Ser. No. 101. pp. 203–222.

ii. Orenstein (A. J.). **Hookworm in Gold-Mines.** [Correspondence.]—*Lancet.* 1934. July 7. p. 51.

i. " Our recent investigations prove that our mines are to-day clear of hookworm ova and larvae and that it is impossible for any miner to be infested or re-infested.

" Our underground soil prophylaxis has thus reached perfection."

In 1886 gold mining by the dry method was started on the Witwatersrand. The miners came up covered like millers with a fine greyish dust, they developed silicosis within 5 years and on the average were dead within 10. Seventeen years ago a hollow steel drill through which water was passed was substituted for a solid one and the miners came up covered with mud ; two years later ankylostomiasis was first recognized and after seven years became alarming. The average vertical depth of mines in the 60-mile-long Reef is 7,000 feet or 500 feet below sea level and the average temperature at the bottom is 75°F. Conditions are, then, propitious for the development of infective hookworm larvae. When it was found that 52 of 67 students of the Government Miners' Training School were infected, investigation of 1,000 Europeans living on the Rand and who had not left it for 5 years showed no hookworm ova. The percentages in recruited natives were 41·5 and for those who had worked in the mines for 10 to 22 months 51·1. Below ground the sanitary conditions were appalling, the latrines grossly fouled, disused slopes, shafts and drives filthy, the soil heavily infected with mature hookworm larvae, and millions of cockroaches and thousands of rats were broadcasting human faeces on their bodies, so aiding the native "sanitary" boys' careless slopping of faeces about as they carried it from latrines to skips, as the lifts are called. A lucky accident led to the re-discovery of what Lambinet had demonstrated in 1906, the lethal effects of common salt. At first a coal tar disinfectant had been used but its lack of penetrative power showed itself by the discovery of flourishing larvae a quarter of an inch below the surface. Now the procedure is to scrub everything weekly up to 2 feet from floor level with a 20 per cent. solution of salt and to strew a layer of salt $\frac{1}{4}$ to $\frac{1}{8}$ inch deep on the floors of and round the latrines, and in the buckets themselves.

Nearly always the worm is *A. duodenale.* A native boy expelling 1,000 worms with one treatment may show little handicap, a European miner would be greatly debilitated. No Europeans have died. Four deaths from ankylostomiasis have occurred and the post-mortem condition is noted in two. They showed 3,553 and 4,342 hookworms respectively, some in each case in the large intestine. [*Ternidens deminutus* was in 1908 found by TURNER (and identified by LEIPER) in these mines, and BLACKIE (this *Bulletin*, Vol. 29, p. 401) reported them in the caecum and ascending colon of man in Southern Rhodesia.] Treatment was evaluated by the tedious and repulsive method of worm collection. Thymol [unparticulated and given with the old restriction of rest and starvation which if applicable to one is applicable to all anthelmintics] cured 75·5 per cent. in one treatment. Carbon tetrachloride was given in 61,000 doses of 3 cc. with 5 deaths and 27 non-fatal poisonings and has been abandoned. For 2 years " thousands of cases " have been treated with carbon tetrachloride 2 cc. and 1 cc. of oil of chenopodium of unstated ascaridole content " with no apparent bad or fatal results. Records show that most of our patients were cured with one treatment, others with two, a third was occasionally necessary." Diagnosis was by Willis's method.

ii. Referring to a leading article in the *Lancet* on HODGMAN's paper, Orenstein writes denying a number of his statements. After 20 years' work he has never seen cockroaches in gold mines in notable numbers ; experiments have failed to confirm the suggestion that " viable " ova can pass through rats ; of East Coast native recruits about 40 per cent. are infected, but they constitute less than a third of the labour ; among the remaining two-thirds it is rare ; the infection rate decreases with residence on the mines and without mass treatment ; it is the grossest possible exaggeration to describe the latrine conditions as appalling. *C. L.*

SCOTT (J. Allen), AYOUB (George E.) & REITLER (Rudolph). **Hookworm Disease in the Coastal Plain of Palestine.**—*Amer. Jl. Hyg.* 1934. May. Vol. 19. No. 3. pp. 601–628. With 5 figs.

An apparent increase in infection with *Ancylostoma duodenale* about Jaffa during recent years seems to be correlated with the amount of orange culture, which itself is dependent on local variations in soil, and on summer irrigation.

Citrus is grown where there is a brick-red loamy sand, well drained and suitable for irrigation. Both Willis's and the Stoll-Hausheer methods of diagnosis were used. " The two series agree fairly well in view of the sampling error involved and the expectancy that the former would average slightly higher than the latter." [Analysis of the authors' figures of stools obtained from the same localities shows that 437 persons examined by Willis's method showed an infection rate of 60 per cent. while 1,951 examined by the Stoll-Hausheer method showed one of 49.] Of the various faecal egg-count groups into which the figures are divided, the largest is that with counts between 800 and 1,300 per gram. Counts are corrected for consistency, and logarithms are used to get curves or polygons. Viable embryonated ascaris eggs were found in the soil of yards of houses wherein lived infected children and their infection in some villages was sufficiently heavy seriously to affect their health. By Baermann's apparatus infective hookworm larvae were isolated in the winter season from corners

between houses, vacant spaces, less frequented streets, disused mills, the banks of streams, the outskirts of villages and the orange groves. In each of these groves is set a house, and pollution of soil is most concentrated in a semicircle just sufficiently large to be concealed by foliage from observation through the gate in the wall, which surrounds the buildings, and this lies opposite the house itself ; pollution is also scattered throughout the grove. During the summer-time irrigation of these groves, soil samples produced hookworm larvae usually to the number of 100 or more, but frequently to several thousands ; whereas in winter the numbers were a few dozen at most. As to haemoglobin the conclusion suggested is that an infection producing more than 2,000 eggs per gram. usually lowers this, and one of over 5,000 markedly so. Bored hole latrines are being instituted to dispose of faeces. *C. L.*

Leger (Marcel). Notions de prophylaxie collective et individuelle à propos de l'ankylostomiase à la Guadeloupe. [**Hookworm in Guadeloupe. Collective and Individual Prophylaxis.**]—*Rev. Prat. Malad. des Pays Chauds.* 1934. Jan. 13th Year. Vol. 14. No. 1. pp. 601–606, 609–610, 613–614, 617–618. [10 refs.]

The paper's title shows its aim and scope.

The preponderating species of hookworm in Guadeloupe is *N. americanus* (Stiles 1902), it being pointed out, however, that Maréchal in 1868 (*Bull. Soc. Path. Exot.*, 1921, p. 159) recognized that the hookworm of French Guiana was distinct from that of Europe. Leger found 108 of 158 persons infected and compares these figures with those for Martinique and French Guiana, but since the diagnostic technique is in no case mentioned their real or comparative values remain uncertain. He sharply distinguishes sick and carriers, though he seems to feel that in secondary bacterial invasion lies the essential feature which divides one from the other, insists that both classes are hygienically dangerous, and refuses to estimate their relative numbers. In tropical countries any hope that in present conditions general hygiene will affect eradication of the hookworm is held illusory, but the various procedures which are advised for stool disposal are enumerated. Personal hygiene by the use of footwear, by individual diagnosis and treatment, and by education is dealt with. The paper ends by quoting Manson's saying that in warm countries many live close to the borderline between health and illness, and that this infection may be the last drop which makes the vessel spill over. *C. L.*

Keller (A. E.), Leathers (W. S.) & Ricks (H. C.). **An Investigation of the Incidence and Intensity of Infestation of Hookworm in Mississippi.**—*Amer. Jl. Hyg.* 1934. May. Vol. 19. No. 3. pp. 629–656. With 4 maps & 3 graphs. [15 refs.]

The authors have investigated the present incidence of hookworm infection in Mississippi. Compared with the figures obtained in 1910–14 by the Rockefeller Sanitary Commission there has been considerable betterment.

The diagnostic method employed was the Stoll-Hausheer, using 1/200 gm. of faeces in all. Since the early figures were obtained by smears the first step was a comparison of 2,412 faecal specimens examined by both techniques. A single slide by each method gave 42·2 per cent. positive by the first and 35·1 by the smear, while a second

slide made the figures 44 and 39·4. Accordingly if the smear methods of the two periods are comparable any lowering of incidence will not be due to methods of examination. In discussing soil and climate, it is held that if 50°F. is, in the mean, the minimum temperature at which larvae will develop to infectivity, it is possible for them to "remain infective" for 8 months in Southern and 7 months in Northern Mississippi. Of the white population 44,380 were examined and showed an infection rate of 19·6 per cent. while from the same counties the earlier investigation showed one of 53·1 in 80,688. Some of the figures for the two periods are interesting. In Alcorn county they were respectively 65·7 and 1·7 but in Attala 16·8 and 15·4. With the exception of persons of 4 years old and under and of those of 55 and over, more males were infected than females; the maxima were 33·4 per cent. for males between 15 and 19 and 21·1 per cent. for females of that age, the averages 22·9 per cent. for males and 16·9 per cent. for females, and egg numbers per gram of faeces were 2,100 and 1,800 respectively. For each county the incidence of infection ran parallel with egg numbers; the same held for infections within the family—as the numbers of infected persons increased so did the egg numbers; and it is estimated "that there are approximately 86,000 infested persons in the rural white population of the 52 counties studied"; [only if it be admitted that to examine 1/200 gm. of faeces will disclose infection when there are 30 or 40 eggs per gram. At least the findings add yet further to the force of the conclusion that egg counts as a means of grading hookworm infected populations are an expensive and tedious way of obtaining information which is equally well given by a positive or negative finding by a not-too-accurate technique.]

Of 6,441 negroes only 1·4 were found infected and here again the average egg numbers were lower, so that about 12 times as many whites as negroes are infected.

About 10 per cent. of the rural homes in the 35 counties are provided with satisfactory means of excreta disposal. The influence of a sandy soil in furthering infection is once again displayed. *C. L.*

RAYBAUD (A.). L'ankylostomose, maladie paysanne. [**Ankylostomiasis, a Rural Disease.**]—*Marseille-Méd.* 1933. Dec. 15. Vol. 70. No. 35. pp. 677–686.

Essentially Raybaud wishes to impress on French readers that an infection common in Italy ought to receive greater attention than it does in adjacent France.

After a historical survey in which Italian work is emphasized, the question of infection of agricultural workers in the south of France is considered. As to conditions said to be favourable or unfavourable to infection, they do not all fall in with the unquestionable experience of others, for he holds that ancylostome larvae seek the subsoil, those of necator the surface, that a clay subsoil is the most favourable medium for development, that a female necator posits 2,600, and ancylostome 9,000 eggs daily. As to diagnosis, anaemia is taken as the master symptom and considerable stress is laid on the belief that to find hookworm eggs in anaemic cases in no way justifies a diagnosis of ankylostomiasis, they must be numerous—over 200 in a preparation made by an unstated concentrative method using an unstated quantity of faeces. In treatment, thymol is given the first place in dosage of 3 gm. (45 grains) daily for 3 days, the need for particulation being

unmentioned. Next is placed tetrachlorethylene on 3 consecutive days in increasing doses of 3, 4 and 5 gm. Carbon tetrachloride is interdicted for its risks. While treatment of the individual should be limited to those obviously ill, for prophylaxis it should include all infected and in prevention the blank wall of ignorance and apathy must be faced. *C. L.*

Cruz (Walter Oswaldo). [In Portuguese & English.] Da medulla ossea na ancylostomose. **On Bone-Marrow in Hookworm Disease.** —*Mem. Inst. Oswaldo Cruz.* 1933. Vol. 27. No. 4. In Portuguese pp. 423–453. With 35 figs. (3 coloured) on 17 plates. In English pp. 454–470.

In 24 deaths from pure hookworm disease there was active regenerative change in the diaphyseal marrow of the femur, but since this did not produce a normal blood, the marrow must in spite of appearances function subnormally.

This is evidently a continuation of work already reported (this *Bulletin*, Vol. 30, p. 218 and note). The appearance on microscopic examination of cancellous marrow is stated in all cases and the figures are profuse and well reproduced. Macroscopically the uniform redness of the marrow is in marked contrast with the pallor of all other organs. Microscopically there is in the marrow great decrease of fat cells with intense proliferation of the essential cells—increase of eosinophil myelocytes and no certain alteration in numbers of megakaryocytes; in the erythrocyte series there are always many foci where there preponderate orthochromatic erythroblasts with nuclei in pyknosis or rhexis. Ferrata is quoted as to the method by which the erythroblast becomes an erythrocyte, namely by pycnotic reduction of the nucleus which is then expelled piecemeal or in toto, or is dissolved in the cell. Witts (*Lancet*, 1932, Vol. 1, p. 549) pointed out that iron is essential for the normal ripening of an erythroblast into an erythrocyte and Cruz found, in two cases which were given iron before they died, that there was "a manifest predominance of erythroblasts with nuclei already segmented, and that in one a reticulocytosis appeared before he died on the second day." Cruz accordingly concludes that the anaemia is not brought about by blood destruction produced in any manner whatever, nor is it caused by exhaustion of the marrow by overuse (excitation by intestinal haemorrhage) or by some toxin, but it is produced by some action of the parasite upon iron metabolism which lessens the amount of this element in the organism and so interferes with blood formation. *C. L.*

Cruz (W. O.). Metaplasia mieloide do baco na ancilostomose. [**Myeloid Metaplasia of Spleen in Hookworm Disease.**]—*Mem. Inst. Oswaldo Cruz.* 1934. Vol. 28. No. 2. In Portuguese pp. 287–298. With 7 figs. on 3 plates. [13 refs.] [Discussion, summary and conclusions in English pp. 299–303.]

The author's summary is as follows :—

"We investigated, in the liver and the spleen of ten pure cases of ankylostomiasis, haemocytopoietic elements. We verified the weight of spleen in 23 cases of individuals from 3 to 60 years old. In no case did we meet with haemopoietic cells in liver. In seven cases we found in spleen elements of the red series at an advanced evolutional stage (orthochromatic erythroblasts with pyknotic nucleus). In some of these cases we

observed megakaryocytes and numerous eosinophilous myelocytes. The three cases which did not show any myeloid metaplasia in spleen were from individuals of over 50 years. Nevertheless, in another case of an individual 59 years old this metaplasia was verified. In individuals of over 20 years, the average weight of spleen in nine cases appeared to be equal to the normal weight. In 14 other cases, between 3 and 14 years of age, the weight of this organ was always sensibly higher than in normal individuals of the corresponding age.

" These results suggest the possibility of the myeloid metaplasia being the fact responsible for the weight increase of spleen in young individuals victimatized by hookworm anaemia.

" The remarkable proliferation of orthochromatic erythroblasts shows that the degree and quickness of blood regeneration after iron administration are due, essentially, to the great quantity of haemoglobin previously formed in the spleen and bone marrow of ankylostomized organisms."

C. L.

Cruz (Walter Oswaldo). Therapeutica da ankylostomose. [**Treatment of Ankylostomiasis.**]—Reprinted from *O Hospital.* Rio de Janeiro. 1933. June. pp. 471–476. With 4 figs.

The drug essential in the treatment of ankylostomiasis is iron.

It is held that all modern works on tropical medicine, and the writings of most specialists, concern themselves only with anthelmintics in the treatment of this infection, though in fact its ill effects are the result of a disordered metabolism of iron. When, and in whatever form, iron enters the stomach it is ionized by the gastric juice and transformed into a ferrous salt which is immediately absorbed on reaching that part of the duodenum where the reaction is still acid. After absorption it reaches the normoblasts in bone marrow and stimulates their activity. An advised dose is 3 gm. of reduced iron which in 20 cases has produced uniform regenerative changes in the red cell series of the bone marrow. This is red in colour, and the normoblast in it is, in ankylostomiasis, held to contain as much iron as does a normal one ; but more iron, apparently twice as much, is needed to convert it into a red corpuscle, and that iron in grave cases has to be supplied.

Deaths from this infection have occurred in Cruz's experience from one of 3 causes : toxicity of anthelmintics, heart failure caused by blood transfusion into the patient, failure to give iron. Nevertheless on giving iron there is a latent period of 2 or 3 days before its effects begin to appear in the peripheral blood, and during that period the serious case is in grave danger. No vermifuge, it is held, should be given till the haemoglobin reaches 50 or 60 per cent. A table shows 12 cases in which after 15 days of treatment by reduced iron the mean haemoglobin had risen from 32 to 48 per cent. by Sahli's instrument, and the red corpuscles from 1,820,000 to 3,310,000, and two photographs show how considerably the oedema had been reduced in one case during that period.

C. L.

Biggam (A. G.) & Ghaliougui (Paul). **Ancylostoma Anaemia and its Treatment by Iron.**—*Lancet.* 1934. Aug. 11. pp. 299–304. With 7 figs. [11 refs.]

Iron can correct ancylostoma anaemia even when the patient is still harbouring the worms, but removal of the worms alone produces little or no change in the blood picture.

This anaemia, it is confirmed, is microcytic (the average size of the red corpuscles by Eve's halometer was 7·44 μ against a normal figure of 7·6 μ) and hypochromic. In apparently 94 cases the average erythrocytes were 2,900,000, haemoglobin 27·8, colour index 0·47, and the lowest figures were 1,400,000, 10, and 0·15. It is pointed out that the plethora of plasma, shown by BOYCOTT and HALDANE, accounts for the everyday experience of cases with only 20 per cent. of haemoglobin, yet complaining merely of slight dyspepsia or pains in the knees on walking. Van den Bergh reaction was always negative so that there was no question of haemolysis, and occult blood was nearly always found in the stools, while before treatment reticulocytes were always less than 1 per cent. In all but 8 cases the worms before iron treatment were got rid of by carbon tetrachloride repeated weekly ; there were no ova by " the floatation method " and further doses revealed none. Hexylresorcinol was unsatisfactory. The greatest number of worms expelled was 141 and generally speaking with an anaemia of 40 to 60 per cent. (80 per cent. by Sahli's instrument being taken as normal) the number of worms did not exceed 20. Moreover, in some cases with no ova found in the stool by this inexactly specified diagnostic technique the clinical symptoms led to the giving of an anthelmintic, " and not infrequently large numbers of worms were expelled."

As to treatment, *Ferrum redactum* 2 gm. thrice daily (70 cases) gave the best results, 5,500,000 red corpuscles and 75 per cent. haemoglobin in 7 weeks, but in 5 cases with hypochlorhydria these figures were 5,400,000 and 54·5. Usually there was a reticulocytosis of not more than 10 per cent. *Blaud's pill* 150 grains [10 gm.] daily was given to 10 patients mostly achlorhydric pellagrins with results similar to such cases under reduced iron. *Ferrous chloride* 0·3 gm. daily (4 cases) gave very poor results. *Liver* 250 gm. daily, fresh and lightly cooked (9 cases) gave a poor response for haemoglobin, though the red corpuscles rose to 5,000,000. In 4 cases iron was withheld, with practically no improvement in 4 weeks. In 8 cases reduced iron was given as above without evacuating the worms. There was rapid improvement, the haemoglobin rising from about 30 to 66·7 in 5 weeks so that " large doses of iron can correct ancylostoma anaemia even when the patient is still harbouring the worms, but the probability is that such cases, if the iron was discontinued, would relapse to their former condition." Iron by intravenous injection had little effect ; by intramuscular injection there was sometimes marked reaction, but it is exceedingly painful unless combined with 1 cc. of 2 per cent. novocaine solution.

C. L.

YAMADA (Akira) & INOUYE (Kazuo). **Nourishment of *Anchylostoma caninum* and the Histological Changes of Intestine thereby produced.**—*Jl. Oriental Med.* 1934. Apr. Vol. 20. No. 4. [In Japanese. English summary pp. 52–53.]

It is believed that *A. caninum* possesses a very strong histolytic secretion capable of digesting the host's tissues, that red corpuscles are not digested since they show no morphological change and no iron pigment was found in the worms, that white corpuscles are not digested, that plasma and lymph must be considered as food, that the intestinal lesions are mechanically and chemically caused, and that the female worm produces greater local damage than the male. [The reviewer

has obtained the iron reaction in the bodies of hookworms, and over 20 years ago Looss described dehaemoglobinization of red corpuscles in the intestine of *A. duodenale.*] *C. L.*

DE ALMEIDA (Jayme Lins). De l'existence du *Necator americanus* (Stiles, 1902) (Nématode) chez le *Coendu villosus* Cuv. (*Roedentia*) au Brésil. [*N. americanus* **found in the Rodent** *C. villosus.*]—*C. R. Soc. Biol.* 1934. Vol. 116. No. 26. pp. 1154–1155. With 1 fig.

About 15 worms, identified as *N. americanus*, were found in the small intestine of the tree porcupine *Coendu villosus*.

The males were 4·8 to 6 mm. long and the females 5·5 to 7·5; other measurements are given and a drawing of the opened bursa of the male. The females though adult contained no eggs. *C. L.*

VAN DEN BERGHE (Louis). L'existence de *Ternidens deminutus* au Katanga. [*T. deminutus* **in Katanga.**]—*Ann. Soc. Belge de Méd. Trop.* 1934. June 30. Vol. 14. No. 2. pp. 189–191.

Judging by egg measurements *T. deminutus* was present in 10 of 204 faecal examinations in Katanga.

This district adjoins Rhodesia. The eggs in question measured 75 to 80 μ by 50 to 52 μ and corresponded in shape to those of *T. deminutus*. Carbon tetrachloride was given to 3 persons without recovery of worms though one of them, deemed to have a mixed infection, passed 4 female necators but still continued to pass eggs of ternidens type. Cultures failed to produce infective larvae. *C. L.*

FAUST (Ernest Carroll), WELLS (Joseph W.), ADAMS (Corine) & BEACH (Ted D.). **The Fecundity of Parasitic Female Strongyloides.**—*Proc. Soc. Experim. Biol. & Med.* 1934. June. Vol. 31. No. 9. pp. 1041–1043.

The number of strongyloides larvae recovered from the faeces is no necessary index of the degree of infection of the intestinal wall.

This is evidently in the nature of a preliminary note which explains the absence of published ground for the underlying but unexpressed assumption that all the female worms were enumerated in the examination of the intestinal mucosa, to which examination the investigation seems to have been limited. In dogs the female worms invade the mucosa at or soon after oviposition begins, and the larvae on hatching work their way into the lumen and are passed; but in the monkey it is the embryonated egg which is usually found in the faeces. Then two apparently conflicting observations are recorded. First, the average counts of progeny in the faeces are usually far in excess of the number of uterine eggs found in the females recovered; second, the number of parasitic females recovered was frequently in excess of expectation, being on two occasions more than the number of larvae "in the inocula." It is held that this excess can be explained only by internal infection, Faust's "hyperinfection." Yet it is noted that faecal larvae may be disintegrating so that, even with great care taken to discover them, such larvae may number 5 to 90 per cent. of the total yield. [But may they not be completely digested and undiscoverable, as the much larger adult hookworms almost certainly are?] Moreover, many living females were non-fecund, the faeces having shown no

larvae for weeks or months, other were encapsuled, and yet others in process of phagocytosis. Samplings of less than 5 gm. of faeces were frequently insufficient to display larvae, so that no one should be pronounced as free from infection without prolonged intensive faecal examination. "Even then the patient may be harbouring tens or hundreds of post-productive females which may account for characteristic symptoms of chronic strongyloides." *C. L.*

Niño (Flavio L.). Consideraciones diagnósticas y parasitológicas acerca de un caso de eosinofilia apendicular. [**Diagnostic and Parasitological Notes on a Case of Appendix Eosinophilia.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1933. Vol. 9. Nos. 79, 80 & 81. pp. 339–345. With 10 figs. [14 refs.]

Routine examination of an excised appendix showed in it a degree of eosinophilia never before met with at the Institute. The blood showed one of 13 per cent. Faecal examination disclosed strongyloides larvae, the duodenal sound none. Regarding the faeces, it is stated that some of the worms showed sexual differentiation even to the possession of spicules, no question being raised as to whether the stool was an old one. It is suggested that the patient may have had the infection for 26 years. *C. L.*

Prommas (Chalerm) & Daengsvang (Svasti). **Nine Cases of Human Gnathostomiasis.**—*Indian Med. Gaz.* 1934. Apr. Vol. 69. No. 4. pp. 207–210. With 3 figs. [10 refs.]

Particulars are given of 9 cases in which gnathostomes have been removed and identified by the authors.

Added to 12 cases reported by others to which references in the literature are here listed, this brings the total of human cases to 21, and an editorial footnote points out that a twenty-second was reported by Maplestone in the Annual Report of the Calcutta School of Tropical Medicine for 1931. Maplestone [this *Bulletin*, Vol. 28, p. 207] drew attention to the fact that of the 12 earlier cases the sex of the worm was noted in 4 and that in all it was male, in which connexion it is worthy of comment that in all the 9 cases now reported the worms are males. The swellings and symptoms produced, and their siting, are noted.

C. L.

Riley (William A.) & Scheifley (Charles H.). **Trichinosis of Man a Common Infection.**—*Jl. Amer. Med. Assoc.* 1934. Apr. 14. Vol. 102. No. 15. pp. 1217–1218.

Examinations of the diaphragms of 117 cadavers in the dissecting rooms at Minneapolis showed 17·9 per cent. infected with trichinella.

The mode of examination was to slice the specimens thin and mount them on the trichina compressors of the type used by the Bureau of Animal Industry before microscopic examination of pork was discontinued in 1907. The average slide contained 5 square centimetres of compressed muscle and the heaviest infection showed 350 calcified measles in this quantity. It is believed that had 50 gm. of muscle been digested, as Queen did, the percentage of incidence would have been higher. It is suggested that there should be extension to small plants of the federal regulations regarding pork products which are ordinarily eaten raw. *C. L.*

PUND (Edgar R.) & MOSTELLER (Ralph). **Trichinosis : Demonstration of the Parasites in the Brain.**—*Jl. Amer. Med. Assoc.* 1934. Apr. 14. Vol. 102. No. 15. pp. 1220–1222. With 1 fig. [21 refs.]

Three weeks after vaccination a negro boy of 11 with sickle-celled anaemia was admitted to hospital for meningitis and died 23 days later. Routine microscopic examination of the brain disclosed trichinae, the naked eye examination showing merely congestion. The only voluntary muscle which had been sent on from the morgue was a small tab adherent to the section of the prostate about the size of the microscopic field of a 2/3 objective and it contained six encysted trichinae. There had been no diarrhoea and no eosinophilia. *C. L.*

FRIEDLANDER (Richard D.). **The Present Status of the Diagnostic Intradermal Test for Human Trichiniasis.**—*Amer. Jl. Med. Sci.* 1934. July. Vol. 188. No. 1. pp. 121–123.

The intradermal test is a valuable aid in the diagnosis of trichinosis. Friedlander writes to minimize any confusion which has been introduced by KILDUFFE (*ante*, p. 395) in his declared preference for eosinophilia over an intradermal test in the detection of trichinosis ; for he used a dilution of 1 in 100 and read his results after 24 hours, whereas MCCOY, MILLER and Friedlander (this *Bulletin*, Vol. 30, p. 694) have shown that in man the best results were obtained when dilution was 1 in 10,000 or more and when the immediate reaction was noted. It is agreed that the antigen is difficult to prepare and so to obtain, a very different matter from showing that it has not definite advantages, and it is pointed out that the presence of eosinophilia does not justify a diagnosis of trichinosis. *C. L.*

TRAWIŃSKI (A.) & MATERNOWSKA (I.). Ueber Präzipitationsreaktion bei Trichinose. [**Precipitin Reaction in Trichinosis.**]—*Zent. f. Bakt.* I. Abt. Orig. 1934. Feb. 28. Vol. 131. No. 1/2. pp. 10–18.

A positive precipitin reaction was obtained from the thirteenth to the fifteenth day after trichinal infection of rabbits. The antigen was obtained by digesting freshly trichinosed material in gastric juice. The reaction took place at 37°C. in 30 minutes to 6 hours and was specific.

C. L.

MCCOY (O. R.). **The Effect of Vitamin A Deficiency on the Resistance of Rats to Infection with** *Trichinella spiralis*.—*Amer. Jl. Hyg.* 1934. July. Vol. 20. No. 1. pp. 169–180. [10 refs.]

In young rats a diet deficient in vitamin A diminished their resistance to trichinosis ; in older rats this did not occur within the limits imposed by the experiments.

The vitamin A content of the liver was determined, and muscle infection was displayed by digesting the carcass in artificial gastric juice which isolates infective larvae unharmed, but dissolves young ones, so that when carried out within 30 days of an infection it does not measure the degree of infection. In each of 7 series of experiments the rats were divided into 2 equal groups, one being controls fed on a vitamin A containing diet, and the other for various times on a vitamin-free one. In the latter the liver lost its vitamin A. Rats were given

about 10 larvae per gram of body weight. In vitamin-fed rats the life of the female trichinella is limited to about 2 weeks, but in the vitamin A deficient animals they survived for as long as the host lived, usually 4 to 6 weeks, a fact which probably accounts for the large numbers of larvae which developed in the muscles of these animals. While controls were immune to a second infection, deficiency rats were not. *C. L.*

Augustine (Donald L.). **Experimental Trichinosis in Chicks.**—Reprinted from *Science*. 1933. Dec. 29. Vol. 78. No. 2035. pp. 608–609.

Trichinal cysts have been found consistently but sparsely in all chicks fed with thousands of isolated trichinella larvae.

Such cysts have never been found on microscopic examination, but have been isolated in all cases by artificial peptic digestion of the muscles. This was undertaken at 45 to 54 days after the date of infection, and at that time all isolated larvae were dead. Their life there must then be short so that it is doubtful whether infection can occur from this source. Since they have never been found *in situ* their method of destruction is unknown. *C. L.*

Semenova (N. E.). Trichocephalosis und ihre Behandlung mit Osarsol. [**Treatment of Trichuriasis by Osarsol.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1933. Vol. 2. No. 3. pp. 149–151. [In Russian. Germany summary p. 151.]

Semenova regards osarsol treatment of trichuriasis as the most effective method known at present. Osarsol (a Russian brand of stovarsol) was used with methylene blue as follows: 0·15 gm. methylene blue 2–3 times per diem for 2 days, osarsol tablets (per 0·25 gm.) in increasing doses from 3 to 6 tablets per diem during 4 days (a total of 16 to 20 tablets). This course of treatment was sometimes repeated at intervals of one month. The total number of cases treated was 102. Total disappearance of ova was observed in 75 per cent. of cases, systematic examination of the faeces being continued from 3 to 21 months after treatment. *C. A. Hoare.*

Li (H. C.). **On the Mouth-Spear of** *Trichocephalus trichiurus* **and of a** *Trichocephalus* **sp. from Monkey,** *Macacus rhesus*.—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11–12. pp. 1343–1346. With 2 figs. on 1 plate.

Li describes and figures a structure in the mouth of *Trichuris trichiura* and in a trichuris from *Macacus rhesus*, which he identifies as the spear-head described by Fülleborn [this *Bulletin*, Vol. 21, p. 219]. He could form no clear conception of a shaft. *C. L.*

Fitzwilliams (Duncan C. L.). **Fistula-in-Ano, caused by the Ova of** *Oxyuris vermicularis*.—*Proc. Roy. Soc. Med.* 1934. May. Vol. 27. No. 7. pp. 932–934 (Sect. Surgery pp. 26–28). With 2 figs.

An ischiorectal abscess repeatedly discharged and healed over in a youth of 17 who had had threadworms since childhood. When its lining granulation tissue was cut away and examined under the microscope, enterobius eggs were found in it, and quassia washes removed numbers of adults from the bowel. As the title shows it is concluded that the eggs caused

the abscess; [the alternative, that the females, having as usual left the anus, crawled into the abscess on one of the occasions when it was open and there oviposited, is not mentioned]. *C. L.*

Hu (Stephen M. K.) & Yen (Chia-hsien). **Studies on the Susceptibility of *Culex pipiens* Linnaeus var. *pallens* Coquillett to Experimental Infection with *Wuchereria bancrofti* Cobbold in Shanghai Area.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1359–1366.

—— & Chang (Teh-ling). **Observations on Natural Infection of *Culex pipiens* Linnaeus var. *pallens* Coquillett with *Wuchereria bancrofti* Cobbold in Woosung District, Shanghai, China.**—*Ibid.* pp. 1367–1372.

i. The susceptibility of *Culex pipiens pallens* to *bancrofti* infection in the Shanghai area was as follows.

Of 88 females, which survived for more than 12 days after the infective feed, 55 per cent. were proved infected. Of 48 infected mosquitoes in which the numbers of larvae were counted, 79 per cent. had 4 or fewer of these; the total number of larvae collected was 185, of which 30 were found in one mosquito, and the average number per mosquito was 3·9. In two more insects which became infected the larvae died before reaching maturity. The distribution of infective larvae within the mosquito suggested that their wanderings within her body did not necessarily take them at once to the head, so that larvae which escaped from the labium and head during a first feed would be replaced by others coming up from thorax and abdomen.

ii. Natural infection of this mosquito in Woosung was as follows. Six lots of *C. p. pallens* were collected from two rooms in which 2 of 6 inhabitants showed microfilariae in the night blood. The insects were taken to the Lester Institute, Shanghai, and there isolated in breeding chambers for 12 days (unless they died earlier) before dissection. The malpighian tubes were scrutinized to detect any trace of occupation by the larvae of *Dirofilaria immitis* since these were found to be indistinguishable from *Mf. bancrofti*. Of 245 mosquitoes, 12 contained infective larvae. The heaviest infection was with 75 larvae, the female concerned being a sick animal unable to fly. Other heavy infections were with 58, 47, 36, 32, 31, 27 and 23 larvae. The last was flying actively when killed. The embryo can, then, undergo complete development under natural conditions in this mosquito. *C. L.*

Poindexter (Hildrus A.) & Jones (R. Frank). *Wuchereria* (*Filaria*) *bancrofti* **Infection in Man with an Unusual History.**—*Jl. Lab. & Clin. Med.* 1934. May. Vol. 19. No. 8. pp. 864–869. With 2 figs.

This negro of 29 had lived all his life in Washington and fishing trips had never taken him more than 100 miles from there. He had been janitor to Filipinos in Washington whose possible infectivity is unnoted in the paper.

He had elephantiasis of the scrotum and right lower limb, enlarged axillary glands and microfilariae (substantiated by micro-photographs) in the night blood. The suggestion seems to be made that infective mosquitoes may have been conveyed with plants which were being constantly imported from the Philippines. It is stated that man is the intermediate and the mosquito is the only proved definitive host in which complete development may take place. *C. L.*

FENG (Lan-chou). **A Comparative Study of the Anatomy of *Microfilaria malayi* Brug, 1927 and *Microfilaria bancrofti* Cobbold, 1877.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1214–1246. With 6 text figs. & 3 plates (1 coloured). [16 refs.]

This study compares *Mf. malayi* obtained from Huchow in the Chekiang Province with *Mf. bancrofti* and *Mf. loa.*

	Mf. bancrofti.	*Mf. malayi.*	*Mf. loa.*
Excretory cell...	Smaller, very near to excretory pore, with a protoplasmic process extending posteriorward	Larger, far behind excretory pore	Similar to *malayi*
Excretory pore	Less distinct and smaller especially in hematoxylin stain	More distinct and larger	Similar to *malayi* ?
G cells—Shape and size	All 4 G cells are same in size, angular or round shaped with little cytoplasm, nuclei small	G1 cell is very large twice as large as the G1 cell of *bancrofti*. The G2, G3 and G4 cells also bigger than those of *bancrofti*, all oval in shape and rich in cytoplasm, nuclei larger	Similar to *malayi*.
Relative position	G2 very far from G1, G4 near to, parallel with or sometimes behind the anal pore	G2 nearer to G1, G4 always before and well separated from anal pore	Similar to *malayi*.
Anal pore ...	Much less distinct and smaller occupying only $\frac{1}{3}$ or $\frac{1}{2}$ the breadth of the width of the worm	Very distinct, larger, occupying more than $\frac{1}{2}$ and sometimes nearly whole breadth of worm	Similar to *malayi* ?
Tail	Tapering gradually to fine point, no nuclei	Swollen at the middle and tip, two nuclei found in the corresponding swellings	Tapering gradually, nuclei of the tail continuous with the nuclear column
General appearance—Attitude ...	Graceful large curves	Large curves complicated with secondary waves	Similar to *malayi*.
Cephalic space	Short, about half or as long as the breadth of worm	From $1\frac{1}{2}$–$2\frac{1}{2}$ usually about 2 times as long as the breadth of the worm	Similar to *bancrofti*.
Nuclear column (hematoxylin stain)	Clear, nuclei round and well separated, space between nuclei stained lightly	Smeared, nuclei oval and entangled in mass, space between nuclei stained darker	Nuclei also oval.

The basis of the comparison rests on the finding that in preparations made in different ways microfilariae have different appearances. This material had by conditions of distance to be 5 days old ; that from each of 24 cases of infection with *Mf. malayi* consisted of ten thick blood smears and a bottle containing 5 drops of blood in 5 cc. of 5 per cent. formalin. Similarly *Mf. bancrofti* was examined in like material from Woosung, Shanghai and elsewhere. The staining recommended is by methyl green pyronin in which smears dehaemoglobinized in normal saline lie for 5 to 15 hours. They are then passed through alcohol—70 per cent. 5 seconds, 85 per cent. 10 seconds, 95 per cent. 15 seconds, absolute 20 seconds and again 1 to 3 minutes—cleared in xylol and mounted in balsam or cedar oil ringed with balsam. The fundamental and characteristic differences are in the excretory cell and pore, the G cells, the anal pore and the tail, and this extract from a table sets them out, Fülleborn's data for *Mf. loa* being also included.

It is pointed out that *Mf. malayi* is structurally near to *Mf. loa* except for its tail, and it is agreed that the former probably belongs to a distinct species whose adults must, however, be found before this point can be definitely settled. [It should be easy to obtain them on F. W. O'Connor's lines of glandular excision.] *C. L.*

Strahan (J. H.). **Notes on the Incidence of Filariasis in Province Wellesley North.**—*Malayan Med. Jl.* 1934. June. Vol. 9. No. 2. pp. 44–47. With 1 map.

Filariasis, with *Mf. malayi* in the night blood predominantly, exists on sand dunes overlooking the sea in the north-west corner of this Province, and no previous record of its presence was discoverable.

A house-to-house survey discovered elephantiasis of the leg, the only clinical sign, in 58 of 4,476 persons examined. A cinematograph film illustrating hookworm, malaria, tuberculosis and child welfare work brought together 1,000 people but there were only 7 volunteers for a blood examination. However, the discovery and microscopical display of wriggling microfilariae in the night blood of the headman proved a welcome impetus and 34 males showed an infection rate of 23·5 per cent. The microfilaria was identified as *Mf. malayi* by Sandosham, Leiper and Brug. No infected mosquitoes have been found. The villagers believe that elephantiasis cases are becoming more numerous.

C. L.

Drinker (Cecil K.), Field (Madeleine E.) & Homans (John). **The Experimental Production of Edema and Elephantiasis as a Result of Lymphatic Obstruction.**—Reprinted from *Amer. Jl. Physiol.* 1934. June. Vol. 108. No. 3. pp. 509–520. With 6 figs.

By centripetal injection of irritants into the lymphatic trunks of the dog's leg there have been produced in dogs oedema, elephantiasis and attacks of acute infection caused by a haemolytic streptococcus.

A lymphatic having been exposed there was injected into it through a quartz canula first about 2 to 4 cc. of a watery suspension of crystalline silica with an average particle size of 1μ, and secondly over 10 minutes the same quantity of a 2 to 2·5 per cent. watery solution of quinine hydrochloride, the latter being repeated once and if possible twice at half-hour intervals. The silica causes the appearance in the sinuses of the next lymphatic node of characteristic large pale cells

undoubtedly arising from the endothelium of the reticulum and wall of the sinus and producing fibrosis. The quinine painlessly scleroses lymphatics as effectively as it does varicose veins. In 3 cases given in detail the numbers of such duplicated injections were 7, 9 and 13. As the result of these repeated injections there appear oedema of the leg, elephantiasis, and spontaneous attacks of acute generalized superficial inflammation of the leg, early in which a haemolytic streptococcus can be isolated for a short time. These attacks last about 48 hours and are clinically similar to those associated with elephantiasis in man; and the resultant lymph is very rich in proteins, half as rich as plasma and having the same albumin-globulin ratio, and contains poorly staining leucocytes. "Such a medium provides excellent growth of connective tissue cells *in vitro* and is, perhaps, the cause of the elephantiatic changes observed in our animals." When these acute attacks were present elephantiasis was rapidly produced, but it could occur without them. They appeared with no local lesion, and they were also induced by injecting into a dog, who had already been subjected to fibrosing injections, streptococci obtained from another dog during a spontaneous attack. Streptococci have not been obtainable from dogs between the acute attacks. [The resemblances to the effects of human filariasis are very striking.] *C. L.*

Paine (R. W.). **The Introduction of *Megarhinus* Mosquitos into Fiji.**—*Bull. Entom. Res.* 1934. Mar. Vol. 25. Pt. 1. pp. 1–32. With 1 text fig. & 3 figs. on 1 plate.

Aëdes scutellaris (*variegatus*) is probably the only vector of filariasis in Fiji and Polynesia. Its control is extremely difficult, for it breeds in small cavities in trees, half coconut shells, etc. The harmless mosquito, *Megarhinus*, has been introduced from Java as a measure of natural control: its early stages are passed in rather similar places, and the larva is predaceous.

Mosquitoes of the genus *Megarhinus* have no direct relation to public health, for they do not suck blood, but their predaceous larvae have perhaps some value. These insects are forest dwellers, putting their eggs in rot-holes in trees, water in broken bamboos, and similar places. The larvae are general predators, feeding on any small animal in the water and frequently eating large numbers of mosquito larvae. The author made full studies on the biology of *M. splendens* in Java. The larvae of this insect are found not only in the forest, but also in barrels, etc., in villages. They resist prolonged starvation, but under these circumstances the mortality among the pupae is very high. It is, however, possible to retard larval growth (without undue effects on the pupae) by rationing them to two Culex larvae per week. After making studies in Java, the author left with 283 larvae and arrived a month later (February 1931) with 238 alive, a result upon which he may surely be congratulated.

In Fiji the early stages were liberated in tubs under a great tree, for it had already been found that the insects would not pair in cages. From this colony other colonies were founded here and there in Fiji as opportunity occurred, and in spite of the fact that 3,000 individuals were taken away and put down in more than 50 places, the original colony was still flourishing after 15 months. Many of the daughter colonies were well established and had been in existence for a year, which corresponds to about a dozen generations. The actual spread of

the insects in one locality was studied from time to time in detail. It was found that the insects spread slowly through forest, colonizing only a certain type of large cavity in trees. They successfully crossed a bare gap of 150 yards, but were held up at one place apparently because they were unwilling or unable to fly through dense undergrowth.

The author describes the benefit which Fiji may perhaps derive from this introduction. *Megarhinus splendens* breeds and spreads slowly : it will only colonize rather large cavities, though in these it is evidently very successful in controlling larvae of Aëdes. On the other hand, it breeds all the year round and has apparently no enemies in Fiji, and it is colonizing tubs, etc., on the edge of villages. It seems unlikely that it will produce a great reduction in the numbers of *Aëdes scutellaris* : the author thinks that it may perhaps reduce them by 5 per cent. On the other hand, the introduction cost the Colony almost nothing, for the author was travelling in pursuit of a different beneficial insect and his work on Megarhinus was incidental. Moreover, the maintenance and spread of Megharinus in Fiji is easy and costs nothing.

[The reviewer has hoped for some years to see this introduction attempted, and is glad to read the results which are recorded in an interesting but rather diffuse paper. It is clear that the insect is established and that it may spread to all parts of Fiji except one dry area. Moreover, it would now be easy to introduce it to nearly all parts of Polynesia, throughout which *Aëdes scutellaris* is so important as the vector of filariasis.] *P. A. Buxton.*

Chopra (R. N.), Mukherjee (S. N.) & Sundar Rao (S.). **Studies on the Protein Fractions of Blood Sera. Part I. Normal and Filarial Blood Sera.**—*Indian Jl. Med. Res.* 1934. July. Vol. 22. No. 1. pp. 171–181. With 3 charts. [24 refs.]

The following conclusions were reached :—

" The protein fractions have been estimated for normal sera under different conditions and it has been shown that different observers get different values for the globulin:albumin ratio possibly due to the different conditions of experiment, viz., temperature, concentration of the electrolyte and the actual conditions of precipitation.

" Following Robertson's method it has been found that the globulin to albumin ratio agrees fairly well with those obtained by Lloyd and Paul (1929) [this *Bulletin*, Vol. 27, p. 561].

" The total globulin, especially euglobulin, in filariasis patients increases while albumin decreases to a certain extent in consequence of which the globulin to albumin ratio is found to increase.

" The physical properties such as surface tension, viscosity and buffer action of sera from filarial blood change very little if at all. What this is due to cannot be definitely ascertained, until all the serum constituents be determined in such cases." *C. L.*

Buckley (J. J. C.). **Development of *Filaria ozzardi* in *Culicoides furens*.** [Laboratory Meeting Demonstration.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. June 30. Vol. 28. No. 1. p. 1.

The demonstration showed the development of *F. ozzardi* in this sandfly both by stained celloidin sections and by *in toto* mounts of larvae freed by dissection. Infection took place in St. Vincent, B.W.I., the time for completion of development in the fly being 8 days.

C. L.

Connal (Andrew). **Calabar Swellings.**—*West African Med. Jl.* 1934. Jan. Vol. 7. No. 3. pp. 113–117.

A description of the disease based on analysis of 45 cases in Europeans and 70 in native Africans met with in Nigeria, most of the former having been under observation for a period of years.

The point is made that the average patient does not take his ailment so seriously as to complain officially and thus may spend several tours of service in the fly area ; while a lady missionary wrote " While busily at work, the swellings were regarded as an irritable nuisance, and little note was taken of the time of their occurrence." The site incidence of the swellings is detailed; in no case did suppuration follow. The worm visited the eye by day in 16 cases, by night in 6, while in 7 there was no periodicity ; and these visits may continue after the swellings have quite ceased, in one case for 8 years. Appearance under the skin of other parts was noted in 22 cases ; but in the individual case such visits were rarer than about the eye, nor was more than one worm thus evident at the same time. It is noted that Glen Liston has devised a method, as yet unpublished, of concentrating the embryos from 5 to 10 cc. of blood, and that this will assist in reducing negative findings. Comment is made on the scanty knowledge of the pathology of the infection, and the report by Klotz is quoted [this *Bulletin*, Vol. 28, p. 217]. " At the Medical Research Institute, Lagos, from 1909 to 1931, most of the specimens of *Loa loa* received were from operations on the abdomen. Actual figures are not available, but it may be stated that, with very few exceptions, all the specimens were male, and no females were observed among those obtained from the eye." Fairley's complement fixation and intradermal tests are mentioned with enthusiasm. Microfilariae are most numerous in the peripheral blood about midday. T. B. Adam's observation is quoted, namely that by rest and darkness the movements of a worm appearing about the eye may be slowed down, and a surgeon may be summoned in time to catch it with forceps or transfix it with a suture in the uncocainized conjunctiva, for to instil cocaine causes its prompt disappearance. " The fate of such embryos as do not gain access to the fly (and they must be innumerable) and the length of time they can survive in the human body are . . unknown. . . . Dissection of over four thousand Chrysops has shown that both large and small infections occur in the fly." *C. L.*

Marchal (Georges) & Lemoine (J.). Filariose avec grande éosinophilie sanguine et insuffisance cardiaque. [**Filariasis with Blood Eosinophilia and Cardiac Insufficiency.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1934. May 21. 50th Year. 3rd. Ser. No. 16. pp. 665–671.

When this man came under observation he had marked oedema, dyspnoea, enlarged spleen, an eosinophilia of 73 per cent. with leucocytes 35,200 to the cmm. but no microfilariae.

He had had in the Cameroons a loa infection attested by Calabar swellings and microfilariae in the blood. In France under calcium chloride and local X-rays over the spleen his cardiac symptoms disappeared though the eosinophilia persisted. Another case of cardiac insufficiency is cited, with death, the post-mortem microscopic appearances being described, it being held pertinent because he " had passed

20 years in Tonkin in areas infected with filariasis (*filaria loa*)." [This last statement will not increase confidence in the conclusion that loa had an essential part in the causation of the cardiac insufficiency of the first.] *C. L.*

D'Hooghe (M.). Contribution à l'étude de l'onchocercose humaine dans l'Uele. [**Human Onchocerciasis in the Uele District, Congo Belge.**]—*Ann. Soc. Belge de Méd. Trop.* 1934. June 30. Vol. 14. No. 2. pp. 153–180. [18 refs.]

A close study has been made of 6 cases of onchocerciasis in Europeans. As in the natives, the nodules specially affect bony prominences and principally the iliac crests, so that it is difficult to implicate the actual biting of simulium as determining their sites. The prurigo from which 3 of them suffered is correlated with allergy due to diffusion of antigen, and not with microfilariae, since these may be present where there is no prurigo and absent where there is. Periodically the nodules become engorged and tender, and this is attributed to massive discharge of embryos and of antigen with them. Fresh extracts of onchocerca gave positive intradermal reactions in 4 cases as well as in 4 persons harbouring *Loa loa*. *C. L.*

Steward (J. S.). *Onchocerca cervicalis* (**Railliet and Henry 1910**) **and its Development in** *Culicoides nubeculosus* **Mg.**—*Univ. of Cambridge. Inst. of Animal Path. (3rd Rep.). 1932–33.* pp. 272–284. With 24 figs. (18 on 9 plates). [Summarized in *Vet. Bull.* 1934. July. Vol. 4. No. 7. pp. 472–473.]

" Steward describes the adult male and female *Onchocerca cervicalis* (Railliet and Henry 1910), from a case of fistulous withers in a horse in Herefordshire. Embryonated eggs were obtained from the cut ends of a female. Microfilariae measuring from 160 to 200 μ long and 2 to 4μ wide were subsequently found in the skin of the horse from 8 a.m. to 6 p.m. in April. In the search for a possible vector, 300 simuliids were dissected for microfilariae after they had engorged on an affected animal. . . . . They were all negative with the exception of one specimen of *S. morsitans* which contained a dead and disintegrating microfilaria."

" In May, 1932, various species of *Culicoides* were found feeding on the affected horse between 7 p.m. and 10 p.m. Of 172 specimens of *C. obsoletus,* nine were found to harbour living microfilariae. *C. parroti* and *C. nubeculosus* were also found to be infected. As the latter species could be obtained in large numbers, it was used for experimental purposes. . . . Microfilariae, on being taken up in the blood by the midge, pass into the midgut and 48 hours after ingestion they measure 210 μ long by 5 μ wide. Seven days after feeding, the microfilariae are found in the thoracic muscles and measure 133 to 240 μ long by 17 to 27 μ wide. About the 20th day, the microfilariae migrate towards the head of the insect where they arrive on the 22nd day and may then be found in the proboscis : they now measure from 600 to 700 μ long and 18 to 21 μ wide. . . . Between 5 and 6 per cent. of midges, dissected within 24 hours of feeding on the infected horse, harboured microfilariae, the largest number in one fly being 26. 126 control midges fed on a pony shown to be free from microfilariae were all negative. . . . The author states that whereas, according to Blacklock, *Onchocerca volvulus* of man takes seven to eight days to pass through its development in *Simulium damnosum* in tropical West Africa, *O. cervicalis*

takes 24 to 25 days to do the same in this country in *Culicoides nubeculosus*. He is of opinion that possibly other species of *Culicoides* may act as vectors."

VAN HOOF (L.). **Serological Reactions in Onchocerciasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. May 9. Vol. 27. No. 6. pp. 609–617. [10 refs.]

Using as antigen an alcoholic extract of tissue rich in *O. volvulus*, there is obtained, it is held, a specific and not a group serological reaction.

Freshly excised onchocerca nodules, freed from any stringy purulent contents and from all tissue not rich in worms, are sliced thin, completely dried over sulphuric acid, and extracted with ether at laboratory temperature (mean 25°C.). The ether is frequently renewed, even 3 or 4 times a day, till a few drops leave no residue. The ether is got rid of by drying in air on a plate at a temperature not higher than 45°C. till there is no ethereal smell. One part of the dried mass is soaked in 5 parts of 90 per cent. alcohol at 25°C. for at least ten days and run through filter paper before use.

Titration is as described by CALMETTE, NIGRE and BOQUET, the technique was that of Calmette and Massol, and the best results were obtained without adding cholesterin and with a titre of at least 8 per cent. In serum the method has failed to give a positive reaction in 12·5 per cent. of cyst carriers, even when microfilariae have been displayed on puncture, but has never given a positive reaction when there have been no "visible or palpable *O. volvulus*." Positive reactions have also been obtained with cerebrospinal, synovial and oedematous fluids. Results are not vitiated by infections with *L. loa*, *A. perstans*, hookworms, ascaris, or trichuris. After cysts have been treated with atebrin and excised, the patients have continued to give reactions. "The test will undoubtedly be of assistance in enabling a definite opinion to be formed regarding the exact etiology of lesions and affections caused by toxins or by embryos migrating from filarial cysts."

C. L.

MIRA (Mario Giaquinto). Sulla presenza delle microfilarie di "Onchocerca coecutiens Brumpt" nel nervo ottico. [**The Presence of Microfilariae of *Onchocerca caecutiens* in the Optic Nerve.**]—*Riforma Med.* 1934. June 2. Vol. 50. No. 22. pp. 858, 861.

The demonstration of microfilariae in the optic nerve itself is believed to be a new observation in this infection.

A young man of 21, a native of Guatemala, was operated on in 1928 for an onchocercal occipital tumour without affection of the eyes. In 1930 a fresh tumour appeared with photophobia, lessened vision and an erysipelatous condition. In 1932 another occipital tumour was removed with benefit to vision, but 4 more nodules appeared and by August 1933 vision of the right eye was completely lost with occlusion of the pupil and that of the left impaired. Accordingly the right eye was enucleated and in the stump of the optic nerve microfilariae were present. It is felt that when there is in such cases blindness with little damage to cornea or iris the injury is probably in the optic nerve, and that this case stresses the urgent need for some chemical which will kill the worms so that all treatment need not rest on their surgical removal.

C. L.

GIBBINS (E. G.). **Further Studies on Ethiopian Simuliidae.**—*Trans. Roy. Entom. Soc. London.* 1934. June 30. Vol. 82. Pt. 1. pp. 51–97. With 1 map and 41 figs. [13 refs.]

Flies of the genus *Simulium* are of considerable importance in Africa, for one of them is the proved vector of *Onchocerca volvulus*. The adults are frequently difficult to breed, and it is important to know the specific characters of larvae and pupae which are easy to collect.

It seems that there are rather more than thirty species of Simulium at present known from Africa. The author gives a full illustrated account of nine of them, all from East Africa. He describes the adults of both sexes, the larvae and the pupae, and he gives notes on breeding places. Some of the species breed in the water of mountain torrents, others in sluggish streams provided they are cool. If pupae are kept in damp air, the adults may frequently be reared. The paper describes a convenient way of doing this, the pupae being fixed to a strip of surgical lint inside a test tube or other vessel which contains a little water at the bottom. *P. A. Buxton.*

JOURNE (H.). Contribution à l'étude des arthrites puriformes au cours de la draconculose. [**Puriform Arthritis in Guinea Worm Infection.**]—*Bull. Soc. Path. Exot.* 1934. June 13. Vol. 27. No. 6. pp. 588–590.

Guineaworm can produce septic arthritis while the skin is intact.

A man from Togo was admitted to the Lomé Hospital with a purulent arthritis of the right knee and with numerous Gram positive cocci in the fluid. About a month after the primary incision a guineaworm presented through the wound, having presumably been instrumental in introducing the bacteria. There followed marked ankylosis of the knee joint. *C. L.*

HSÜ (H. F.) & WATT (John Y. C.). *Dracunculus medinensis* **Infection in Two Dogs in Peiping. Experimental Infection of Cyclops.**—*Chinese Med. Jl.* 1933. Nov.–Dec. Vol. 47. Nos. 11 & 12. pp. 1326–1330.

The infected dogs were 12 and 13 months old, had been born in Peking and had never left it. In one, four worms developed ; in the other, one. The larvae began development in *Cyclops leuckarti*, *C. magnus*, *C. serrulatus* and *C. ternis*, but all the cyclops died before it was complete. Guineaworm has never been reported in man in Peking and only once there from the tarsus of a horse. *C. L.*

BENVAMINE (Georges). L'ankylostomiase en Afrique du Nord. [Thesis : University of Algiers.]—77 pp. With 1 fig. [7 pages of refs.] 1934.

BIBLIOGRAPHY OF HELMINTHOLOGY FOR THE YEAR 1932. Compiled by A. WALTON from Titles selected by R. T. LEIPER. 1934. Mar. 97 pp. St. Albans : Imperial Bureau of Agricultural Parasitology, Winches Farm Drive, Hatfield Road.

COTTI (Luigi). Su un caso di anemia perniciosa pseudoaplastica in corso di anchilostomiasi.—*Haematologica.* Pavia. 1934. Vol. 15. No. 4. pp. 327–353. With 3 figs. [47 refs.] French summary p. 353.

DUPONT (Robert). Un cas de vers de Guinée observé en France.—*Rev. Med. et Hyg. Trop.* 1934. Mar.–Apr. Vol. 26. No. 2. pp. 96–99.

Fróes (Heitor P.). Sobre um caso invulgar de infestação pela *Wuchereria bancrofti* em que fôram reiteradamente encontrados embriões filaricos em liquido acitico sero-fibrinoso.—Reprinted from *Bahia Medica.* 1933. June. No. 6. 11 pp.

Fróes (H. P.). On a Very Rare Case of Bancroftosis (Bancroft Filariasis). Summary and Conclusions.—*Jl. Trop. Med. & Hyg.* 1934. June 15. Vol. 37. No. 12. pp. 183–184.

Girges (Rameses). Schistosomal Secondary Anaemia in Egypt. Youth's Insidious Enemy.—*Jl. Egyptian Med. Assoc.* 1934. Mar. Vol. 17. No. 3. pp. 273–284.

Molina (Rafael Rodriguez), Hoffman (William A.) & Rojas (Eli S.). Aplicacion del tubo duodenal para el tratamiento de la teniasis.—*Bol. Asoc. Med. de Puerto Rico.* 1934. Feb. Vol. 26. No. 2. pp. 57–59.

Musger (Anton). Ueber Hauterscheinungen bei Trichinose.—*Dermat. Ztschr.* 1933. Nov. Vol. 68. No. 1/2. pp. 34–39. With 1 text fig.

Pardina (José M.). Parasitosis apendicular en Córdoba.—*Semana Méd.* 1934. July 19. Vol. 41. No. 29 (2114). pp. 210–214. With 5 figs. [22 refs.]

Robatto (Angel G.). La filariosis en el Africa occidental. Sobre el tratamiento incruento de los abscesos filariosicos.—*Medicina Países Cálidos.* Madrid. 1934. July. Vol. 7. No. 7. pp. 331–335. [23 refs.]

Ronka (Ensio K. F.). Infestation with *Diphyllobothrium latum.* Fish Tapeworm.—*New England Jl. of Med.* 1934. Mar. 15. Vol. 210. No. 11. pp. 582–583.

Sandosham (A. A.). The Treatment of Intestinal Helminthic Infestation : a Review.—*Malayan Med. Jl.* 1934. Mar. Vol. 9. No. 1. pp. 55–64. [63 refs.]

MISCELLANEOUS.

Crónica Médico-Quirúrgica de la Habana. 1933. Dec. Vol. 59. No. 12. pp. 477–521. Número Especial dedicado al Centenario del Natalicio del Dr. Carlos J. Finlay. [**Finlay Centenary Number.**]

The December issue of this journal is dedicated to the memory of Dr. C. J. Finlay, whose birth took place on December 3rd, 1833, and does homage to a great man whose need of praise has generally fallen short of his just due, except, strange to say, in his own country.

Dr. Juan Guiteras contributes a brief biographical sketch. Dr. Finlay was baptized Juan Carlos, but called himself and was always known as Carlos until his son Carlos Eduardo started to practice medicine when the father adopted the J. (Carlos Juan Finlay) to distinguish between them. His education as a boy in France at Le Havre, and later at London and Rouen, and his final qualification from the Jefferson Medical College, Philadelphia, and his return to Cuba are noted and the main facts of his life which are probably known to all readers of this *Bulletin*.

This Centenary number has as a frontispiece a portrait of Dr. Finlay, but it has lost clarity in reproduction. It contains also the original article, read before the Academy of Science at Havana on 14th August 1881, in which he marshalled the evidence incriminating the mosquito (at that time called a Culex) as the transmitting agent of yellow fever. It is of the highest interest even now. He tells also of the experimental work which he undertook to confirm his hypothesis.

Another section is devoted to aphorisms or extracts from Finlay's papers and manuscripts in the course of 25 years, from 1881 to 1906.

Colonel Roger Brooke, of the United States Army, contributes an appreciative article (here translated into Spanish) which he delivered at the Commemoration Session held at Washington and this is followed by another by Dr. L. O. Howard, of the United States Bureau of Entomology, on the Importance to Man of the Discovery of the Insect-Transmission of Disease.

It is perhaps not generally known that in 1902 Dr. Theobald proposed that the name *Stegomyia fasciata* might be changed to *S. finlayensis* in honour of Dr. Finlay, but the laws of nomenclature could not be thus set aside, though these same laws have now relegated the former to become an *alias*. Finlay was also proposed in 1905 for the Nobel Prize, but it was ruled that the work had been done at too remote a time.

In conclusion we may say that this issue of *Crónica Médico-Quirúgica de la Habana* is one of considerable interest as a small tribute to one who has always been held in honour and his work in grateful remembrance in Cuba. *H. H. S.*

Proceedings of the Royal Society of Medicine. 1934. May. Vol. 27. No. 7. pp. 865–876 (Sect. Trop. Dis. & Parasit. pp. 31–42).—**Discussion on Some Aspects of Intestinal Diseases of European Children in the Tropics** [Manson-Bahr (P. H.); Maitland-Jones (A. G.); Mackie (F. P.); Watson (Malcolm); Findlay (Leonard); Wright (H. W. S.)].

Dr. Manson-Bahr regards *Bacillary Dysentery* as " the most formidable and pernicious visitation in European children in the Tropics."

It runs a more acute and severe course than it does in native races. Signs of toxic absorption may overshadow the bowel symptoms. The stools may be diarrhoeic rather than mucosanguineous. Most cases are caused by the Flexner group of organisms, but in Egypt Sonne's bacillus is mainly responsible. Treatment is considered at length. Antidysenteric serum is considered to be of importance, given in sufficient amount and early; he advises 10–20 cc. by the intramuscular route at the outset. *Amoebiasis* is a rare disease in European children. MANSON-BAHR has never seen or treated a genuine case of amoebic dysentery in a child under 10 years of age [see this *Bulletin*, Vol. 30, p. 22 where the age given is five years]. It should be diagnosed only with great circumspection because emetine may have grave effects in young children. In non-European children in India and Egypt it is not rare. He writes—"I am constantly having small cachectic and emaciated children brought to me who are obviously suffering from emetine intoxication, the emetine having been given on the mistaken notion that they are suffering from amoebiasis."

Giardiasis.—MANSON-BAHR thinks that of the intestinal flagellates *G. intestinalis* has the strongest claim to be considered pathogenic. The symptoms resemble those of coeliac disease—persistent diarrhoea, abdominal enlargement and retardation of growth [see MILLER, this *Bulletin*, Vol. 23, p. 679]. *Coeliac disease* is not rare in European children from Malaya and India. It is suggested that defective fat assimilation with maldigestion of carbohydrates has much to do with the uncontrolled temper of European children in the tropics. *Sprue* in children is very rare. *Polypus* is often mistaken for dysentery. A form of *idiopathic ulcerative colitis* in children under ten is similar to the disease in adults. *Tuberculous ulceration of the colon* is not uncommon; the bacilli are difficult to detect. *Worm infestations* are also discussed.

Colonel MACKIE said that of all the diseases of children in the tropics bacillary dysentery was most to be feared. Shiga must be distinguished from Flexner dysenteries; he agreed that the great majority of dysenteries in children were bacillary. He disbelieved in the pathogenicity of Giardia.

Mr. H. W. S. WRIGHT said that in North China bacillary dysentery in children had a 50 per cent. fatality. Scarlet fever also was a fatal disease, being associated with a very virulent haemolytic streptococcus; early blood transfusion from a previously infected child or adult was the best remedy. Speaking as a surgeon he said it was impossible to overemphasize the importance of ascaris infection in obscure abdominal conditions and gave instances. In reply to a question by Dr. MAITLAND-JONES Sir Malcolm WATSON said that in Malaya he advised parents to keep their children there till ten years of age.

[Much of this discussion was concerned with children's diseases as seen in Great Britain.] *A. G. B.*

TEICHLER (G.). Einige Notizen zur Formalinprobe im Blutserum. [**Notes on the Formalin Serum Test.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1934. June. Vol. 38. No. 6. pp. 255–257.

The very simple formol-gel serum test is not employed to the extent it might be. It can be useful especially to the practitioner in the tropics, who for the most part is deprived of the advantage of the Wassermann reaction and of X-ray investigation. This test consists in the addition of one drop of commercial formalin to ½ to 1 cc. of test serum and

watching for the formation of a gel, after 1, 4, or 24 hours. The reaction was tested in 280 cases of diagnosed disease and gave positive results in tuberculosis, leprosy, syphilis and yaws. Kala azar, in which the reaction is positive, does not occur in East Africa. There is also a positive reaction in cases of bilharzia infection, but this disease presents no difficulty in diagnosis. In other diseases the reaction was negative. There is help then to be obtained from the formalin test, although it is in no way specific. *W. F. Harvey.*

Velho-Da-Silva (J.) & Pontes (José P. L.). Estados vesiculares determinados por parasitas animaes. Cholecystopathias por Lamblia e Strongylus. [**Animal Parasites in the Gall-Bladder.**]—*Brasil-Medico.* 1934. Jan. 13. Vol. 48. No. 2. pp. 28–31.

In this short article the authors describe eight cases. Six of the patients, whose ages ranged between 20 and 42 years, presented symptoms of cholecystitis—gastric discomfort, anorexia, nausea, at times vomiting, occasional paroxysmal pains in the right hypochondrium and jaundice. The duodenal sound was passed and in the bile were found numbers of *Giardia lamblia.* [The author speaks of Bile A which might show none, and Bile B in which they were numerous, but does not state what he implies by these terms.] In another patient the parasites were found, but there had been no symptoms. In yet another, there were numerous specimens of *Strongyloides stercoralis* [not strongylus, as stated in the title of the paper] but no Giardia.

H. H. S.

Mertens (W. K.) & van Veen (A. G.). Recherches sur la cause d'un empoisonnement fréquent chez les Javanais. [**A Frequent Cause of Poisoning in Javanese.**]—*Bull. Soc. Path. Exot.* 1934. May 9. Vol. 27. No. 5. pp. 488–490.

The intoxication in question is the cause of numerous deaths in Java. It is characterized by its fulminating course, the preponderance of nerve symptoms and the absence of gastro-intestinal symptoms.

It is produced by the ingestion of coconut, or food prepared therewith, when it has been in contact with air, prepared the day before and in part freed from fat, and occurs as a rule after the eating of coconut " cake," the residue of the preparation of oil among the primitive folk. It does not occur in the factories, the residues of which contain little oil. The cause is a microbe which the authors have isolated and call " Bacillus cocovenenans." This organism forms with coconut oil a virulent poison, the fatal dose of which by mouth is 0·5 mgm. It is a saprophytic rod, not staining by Gram, strongly motile, very resistant to desiccation, developing well on all artificial media, even anaerobically, but producing the poison only on certain media. The oil is decomposed by it into a glycerine and a fatty acid fraction. The poison has been isolated, it is not a toxin in Pasteur's sense, it has the formula $(C_6\ H_6\ N_4\ O_2)x$ and has been named toxoflavine, because it belongs to the flavine group. Its properties are analogous to that of one of the fractions of Vitamin B_2. An analogous poisoning is that of ergot of rye, in which *Claviceps purpurea* produces the poison.

The symptoms may appear in 4 hours. The patient complains of malaise, and of abdominal pains and meteorism at the pit of the stomach. He becomes dizzy and has to lie down. He is pale and sweats. His

fatigue increases and he desires sleep. Paraesthesiae may appear and coma supervene with death in 6 to 10 hours. If he does not become comatose he may recover but even then he may die suddenly. The incubation may be prolonged to 44 hours. The duration is from 24 hours to 2 days. During coma he has tono-clonic convulsions and he grinds his teeth ; the eyes are open and the pupils strongly dilated. Clinical examination reveals no lesion, nor does autopsy. The authors suggest that this form of poisoning may occur elsewhere, *e.g.*, in the French Colonies. [This is the so-called bongkrek poisoning. See *Bulletin of Hygiene,* Vol. 9, pp. 551 & 552.] *A. G. B.*

i Souchard. Remarques sur le diagnostic de la mélioïdose. [**Diagnosis of Melioidosis.**]—*Bull. Soc. Path. Exot.* 1934. Mar. 14. Vol. 27. No. 3. pp. 233–234.

ii. Pons (R.). A propos du diagnostic de la mélioidose.—*Ibid.* May 9. No. 5. pp. 473–475.

i. Apropos of a claim made by Pons of priority of record of cases of melioidosis in Cochin-China the author contests the claim on the ground that the diagnosis was serological and that for the recognition of this infection in life it is necessary to isolate the bacillus either by culture or inoculation ; sero-diagnosis is not of service. He cites Stanton & Fletcher in support of this opinion.

[Stanton and Fletcher write : " A trustworthy diagnosis of melioidosis can be made only by cultivation of the causative organism. . . . Agglutination tests are of little practical value." " Melioidosis." 1932. Studies from the Institute for Medical Research, Federated Malay States. No. 21.]

ii. Reasoning that serological evidence is admitted for the presence of other diseases, such as typhoid and yellow fever, Pons maintains his position. *A. G. B.*

Schwetz (J.) & Kadaner. Sur une épidémie mystérieuse observée, en 1932, parmi les Européens de Stanleyville (Congo belge) et en relation avec un bassin de natation. [**A Mysterious Swimming Pool Epidemic among Europeans at Stanleyville.**]—*Bull. Soc Path. Exot.* 1934. Apr. 11. Vol. 27. No. 4. pp. 354–364.

In this epidemic definitely related to the opening of a swimming pool at Stanleyville, Belgian Congo, the diagnoses considered were enteric fever, dengue, leptospirosis, yellow fever ; no conclusion is reached, but leptospirosis appears to be most probably correct.

The pool was made early in 1932 and opened in March using the overflow of a reservoir. It is noted that the water was renewed very slowly, 6–7 days being required when the pool had been emptied. In May 6 Europeans fell ill, all assiduous bathers. The bath was then emptied, but two months later it was again brought into use and there was another outbreak, 7 bathers being admitted to hospital, one of whom died. The pool was closed in August and in the 6 succeeding months there were no similar cases.

After a period of malaise and lassitude the temperature rose rapidly to 39·5° and 40° ; there was pronounced weakness, headache, musculo-articular and retro-ocular pains, tenderness of the posterior cervical glands and usually the axillary, pulmonary congestion with dyspnoea ; on the 3rd–4th day cessation of symptoms, then a return and another rise of temperature lasting 2 days, followed by a morbilliform or scarlatiniform evanescent rash, and subicterus of the conjunctiva with

a trace of albumin in the urine ; in the second febrile period the pulse (70–80) did not follow the temperature. No desquamation ; pruritus exceptional. Convalescence was slow. In three patients there was frank jaundice, in three slight, and in 8 none at all. The three jaundiced patients had eye symptoms and a specialist diagnosed iridocyclitis in two. Five patients had a relapse. The duration, apart from relapse, was 8–16 days. In the severe cases there was no rash.

Enteric fever was eliminated at the first outcrop, dengue was negatived by the absence of leucopenia, malaria by the absence of parasites. There was much in favour of leptospirosis, though the authors were unable to find spirochaetes in the blood or urine of two icteric patients or in guineapigs inoculated therewith or in the local rats, and they recall the Syra epidemic [this *Bulletin*, Vol. 29, p. 566 ; Vol. 30, pp. 15, 408]. Specimens of sera were sent to PETTIT in Paris and SCHÜFFNER in Amsterdam ; the results were not conclusive but these savants agreed that two of the severe cases gave a positive reaction for leptospirosis. Both laboratories reported in the negative for yellow fever. Lastly it is said that this affection resembles " red Congolese fever," which, however, is mild and of short duration. *A. G. B.*

FOURNIALS. Traitement des diarrhées chroniques par la méthode de Montel. [**Treatment of Chronic Diarrhoea by Montel's Method.**]—*Marseille-Méd.* 1933. Nov. 5. Vol. 70. No. 31. pp. 509–514.

Montel's method, briefly described in this *Bulletin* [Vol. 25, p. 626], consists in administration of antidysenteric serum by mouth and rectum. The author treated five patients with persistent diarrhoea probably beginning with bacillary dysentery. They had been submitted to various treatments without benefit. He gave by mouth as much as 12 ampoules of serum a day. The class of diarrhoea which is benefited is that in which the stools are foetid and coloured, with or without blood and mucus. *A. G. B.*

VASSALLO (S. M.). **Tropical Neurasthenia : its Possible Relationship to Hyperthyroidism.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. May 9. Vol. 27. No. 6. pp. 625–627.

The author with many years experience of the African tropics has seen several cases of Europeans with sleeplessness, irritability and frequent pulse, which he has believed to be due to thyroid hyperactivity and which have responded well to iodine treatment. Such patients have a high fasting blood sugar reading of about 0·18 per cent. and he suggests that a rise in blood-sugar is an early symptom of tropical neurasthenia. He notes that SEQUEIRA (1932) has put forward the hypothesis " that some cases of nervous irritability (in East Africa) may be related to excessive activity of the thyroid gland " and that glycogenic disturbances in hyperthyroidism are well known. He suggests that the iodine treatment may be worth further trial in these cases of irritability in the tropics which tend to pass on to tropical neurasthenia. *A. G. B.*

TALIAFERRO (William H.). **Some Cellular Bases for Immune Reactions in Parasitic Infections.**—*Jl. Parasitology.* 1934. Mar. Vol. 20. No. 3. pp. 149–161. [30 refs.]

CANNON and TALIAFERRO (1931) and Taliaferro (1932) (this *Bulletin*, Vol. 28. p. 494 and Vol. 30, p. 726) found that although malaria due to

Plasmodium cathemerium is a general infection, yet, practically, only the macrophages of the spleen, liver and bone marrow are involved in defence ; this results from the circulation in these organs being sluggish, so that the parasitized red cells come into prolonged contact with the macrophages. In the case of *Leishmania donovani* infection, while the macrophages ingest the parasites they have not the power to digest them.

A different mechanism is at work in *Trypanosoma lewisi* infection of the rat, whereby fission of the trypanosomes is caused to cease. This inhibition is due to a specific antibody which is transferable passively to normal rats and which is diminished by splenectomy and India ink blockade. Trypanocidal antibodies which kill the trypanosomes by extracellular lysis or opsonization are also formed and have been shown by Taliaferro to be similarly diminished by these two procedures. That the spleen possesses peculiar properties in addition to its content of lymphatic and reticular cells, seems unlikely in view of the ease with which a large part of the loss sustained through splenectomy is made good by the body.

Passing to the consideration of immunity in helminth infections, the author considers the work of O'Connor and Hulse (1932) and O'Connor (1932) (*loc. cit.*, Vol. 29, pp. 765–6) on *Wuchereria bancrofti* filariasis, suggestive of the same cells being responsible for the defence in such worm infections as in protozoal infections. Miller and Gardiner (1932) (*tom. cit.*, p. 748) have now produced the first clear evidence of transfer of *passive* immunity among helminths, in the case of the cysticercus of *Taenia taeniaeformis*.

Following the experimental demonstration by Blacklock and Thompson (1923) of acquired immunity after infection by a metazoan parasite, *Cordylobia anthropophaga*, Blacklock and Gordon (1927) studied the immunity reactions (*loc. cit.*, Vol. 21, p. 150 and Vol. 25, p. 252). Taliaferro discusses the results and is undoubtedly correct and well within the mark when he observes that the cellular basis of the immunity in helminth and other metazoan parasites has not been adequately studied. It is an advance, however, to have proved that immunity to such parasites exists and can be produced experimentally ; possibly the actual mechanism will be elucidated in due time.

The author believes that where investigators have attempted to exclude antibodies they have generally meant serum antibodies and have given inadequate consideration to the local production of opsonins which may be effective only locally.

The reactions of normal and immune serum and drugs on the macrophage system are briefly discussed in the concluding section of this interesting and suggestive, if necessarily abbreviated, review of some of the more recent work on immunity in diseases due to protozoa and metazoa. *D. B. Blacklock.*

Peter & Gaehtgens. Ueber den serologischen Nachweis der Dasselarveninfektion beim Rind und beim Menschen. [**Serological Demonstration of Warble Infestation in Ox and Man.**]—*Zent. f. Bakt.* I. Abt. Orig. 1934. July 2. Vol. 132. No. 1/2. pp. 81–90.

The losses which German agriculture suffers owing to the warble fly run into millions and make it easily understood why all affected districts have united in energetic measures of defence. It has long been recognized that young animals exposed to infection may be affected,

but with diminishing numbers of warbles in several successive years; the warbles cease to appear after about five years, even though the animals are still exposed to infection; seemingly a specific resistance has developed in such animals. The work of HADWEN and FULTON, HADWEN and BRUCE, ROUBAUD and PÉRARD, KOEGEL and of PETERS is mentioned and their finding of antibodies which give a precipitin reaction with protein substances present in the larvae, and also the anaphylactic effects produced by larval extracts when introduced intravenously, subcutaneously or by the conjunctiva. The authors in the experiments now recorded, treated rabbits by repeated subcutaneous injections of watery (physiological sodium chloride solution) extracts, and then tested their serum in complement-fixation and flocculation tests, using various larval antigens. For test antigens one part of very finely ground larval tissue was extracted with 5 parts of the extraction fluid, physiological salt solution or alcohol, for several months so as to obtain the greatest possible amount of active substance in solution. Details of the technique used and the results of several of the experiments are given.

The authors found specifically reacting antibodies present in the serum of the injected rabbits, in the serum of many naturally infected cattle, and also in the serum of a human case of infection with a larva which was apparently a warble larva. *D. B. Blacklock.*

FITZGERALD-MOORE (D. G.). **Retrobulbar Neuritis cum Avitaminosis.** —*West African Med. Jl.* 1934. Jan. Vol. 7. No. 3. pp. 119–120. [Summary appears also in *Bulletin of Hygiene.*]

In this brief paper the author recurs to the condition previously described by him—a condition the study of which is not only of intense clinical and scientific interest, but is of wide public health importance in the tropics and perhaps elsewhere. After symptoms of glossitis and stomatitis and pruritus of the external genitalia there ensues a dimness of vision (in some patients this occurs at the same time as the other symptoms) with loss of central acuity, but not diminution of field of vision, a " partial post optic atrophy " which is not progressive.

School children are particularly affected, though the condition is not limited to them; a common factor in all appears to be prolonged " bad food conditions," and in the author's opinion, which is of much value as he has seen more than 300 cases in 4 years, probably the use of *gari*, a common and cheap food. This played a large part in the diet and in some patients almost to the exclusion of other foodstuffs. Whether the disease or symptom complex, is a pure avitaminosis or whether there is some undetermined toxin at work is a question for further study. The author draws attention once more to similar conditions described by SCOTT in Jamaica (this *Bulletin*, Vol. 13, p. 372) and WRIGHT in Sierra Leone (*Bulletin of Hygiene*, Vol. 4, p. 391). [See also MOORE, *Bulletin of Hygiene*, Vol. 8, p. 441.] *H. H. S.*

BELL (P. S.). **The Treatment of Tropical Ulcers and Granulating Areas.** —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Mar. 12. Vol. 27. No. 5. pp. 511–516.

The author has extended the strapping method described by SAYERS after Dickson WRIGHT [this *Bulletin*, Vol. 30, p. 36] to the treatment of any granulating area.

It should in his opinion not be employed for tropical ulcers till the ulcer presents a non-sloughing granulating surface. To obtain such a surface application of powdered pot. permang. though very painful is by far the best of antiseptic dressings, but excision, curettage, and cauterization with pure carbolic is better still. The operation is followed by eusol dressings. A healthy surface is obtained in less than a week and then the adhesive plaster is applied only from a little below to a little above the ulcer ; there is rarely any generalized oedema in the case of tropical ulcer so that the whole leg need not be covered. The dressing is left undisturbed on each occasion for 7–21 days. To facilitate removal he wraps the leg in a *single* layer of gauze, cutting a hole for the ulcer. The strapping can then be easily raised for removal by scissors. A table includes 19 cases ; the average rate of healing was 0·21 sq. in. per diem and the time taken a little over 30 days (14 to 49). One of the ulcers was of two years' duration.

Granulating ulcers are skin grafted by Braun's method before strapping is applied. For the technique, largely Dickson WRIGHT's, the paper must be read. *A. G. B.*

SAYERS (Edward G.). **The Filarial Intradermal Skin Test in Tropical Myositis and Muscle Abscess.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Mar. 12. Vol. 27. No. 5. pp. 507–509.

Of eight cases of tropical myositis tested in the British Solomon Islands with Fairley's filarial intradermal test seven were negative.

BUXTON queried the filarial origin of tropical myositis as did the author [this *Bulletin*, Vol. 28, p. 46]. He therefore obtained a supply of *Dirofilaria immitis* antigen. The two first patients tested were one with microfilariae and one with elephantiasis and no microfilariae ; both were positive, a large spreading wheal being produced. Only one of the myositis cases, which are described, gave the reaction ; it has not been possible to examine this patient further. The author realizes that further work is needed but the results are to his mind strong evidence against the filarial origin of this affection. *A. G. B.*

DAVID (J. Christodoss), RAJAMANIKAM (N.) & KRISHNASWAMY (R.). **Some Observations on the Cardiovascular Action of Urea-Stibamine.** —*Indian Jl. Med. Res.* 1934. Jan. Vol. 21. No. 3. pp. 617–624. With 3 graphs.

These experiments were undertaken to extend the observations of CHOPRA (1927, see this *Bulletin*, Vol. 25, p. 412) who employed cats. The present authors used only dogs. They came to the following conclusions :—

" Urea-stibamine produces marked constriction of the volumes of the spleen, liver, kidney and intestines. There is a compensatory increase of the limb volume. The vasoconstriction is most marked in the liver and least in the lungs.

" Two hundred mg. to two hundred and fifty mg. of urea-stibamine given intravenously to anaesthetized dogs leads to a transient depression of the heart and dilatation, as observed by the myocardiograph. This effect appears in about 40 seconds and disappears in 1½ minutes.

" On the blood-pressure the more constant effect is a preliminary fall succeeded by a rise above normal. This rise is not abolished by ergotoxin

and seems to be correlated with the marked constriction of the splanchnic blood vessels. The preliminary fall is perhaps due to the transient depression of the heart and diminished cardiac output. These results are obtained with doses that produce a concentration in the dog's blood of approximately 10 times that usually found in the human blood after therapeutic injections of about 200 mg. of urea-stibamine.

" Electrocardiograms taken after intravenous injections of 200 mg. of urea-stibamine to dogs and human beings show no abnormality.

" Therapeutic doses of about 200 mg. given intravenously to [10] human beings produce little effect on the blood-pressure.

" The classification of antimony among capillary poisons is questioned."

A. G. B.

CHOPRA (R. N.) & DE (Premankur). **A Preliminary Note on the Pharmacological Action of** *Antiaris toxicaria.—Indian Jl. Med. Res.* 1934. Jan. Vol. 21. No. 3. pp. 513–517. With 5 figs.

Antiaris toxicaria, the Upas tree, once reputed to destroy any living thing that approached it, is found in the Deccan peninsula as a large evergreen. The sap is used as an arrow poison in Burma and in Java, but its poisonous properties are not widely known in India and Ceylon.

The authors studied the chemical composition of the milky juice and its pharmacological action. The dried juice was found to have a slight stimulant action on the heart and circulation and in larger doses to act as a strong cardiac poison. The action was mainly on the myocardium and was stronger on the auricle than on the ventricle. The juice has perhaps some effect on the terminations of the vagi. There was no action on the higher centres. The drug produced a tonic contraction of the isolated as well as the intact intestines and uterus. The experimental animals were guineapigs, rabbits and cats.

[H. H. SCOTT (Byam's & Archibald's Practice of Medicine in the Tropics, Vol. 1, p. 769) states that the poison causes paralysis of the central nervous system.] *A. G. B.*

VLEURINCK. Un cas d'empoisonnement par le lupapi. [**A Case of Poisoning by " Lupapi."**]—*Bull. Méd. du Katanga.* 1933. Vol. 10. No. 5. pp. 122–123, 125.

" Lupapi " is a Polygalaceous shrub, widespread in Tropical Africa, the Latin name of which is *Securidaca longipedunculata* Fresn. It contains methyl salicylate, or oil of wintergreen, in considerable quantity. In Katanga the native woman commits suicide by crushing or powdering the roots and stuffing them into the vagina. Death follows in 48 hours or later.

[The following extract from " The Medicinal and Poisonous Plants of Southern Africa " (WATT and BREYER-BRANDWIJK), Edinburgh, E. and S. Livingstone, is of interest :—

" We are informed that at Lealui a Rotse woman died after inserting the crushed roots [of *Securidaca longipedunculata*] into the vagina . . . . Our informant in this case distilled an *oil* from the root which, on analysis, was found to consist of 99·5 per cent. *of methyl salicylate.*"]

A. G. B.

Pookels (W.). Experimentelle Studien ueber die Wirkung des Retikuloendothels auf die Toxizität und die Heilwirkung der Arsenobenzole. [**Action of the Reticulo-Endothelial System on the Toxicity and Curative Action of Arsenobenzol.**]—*Arb. a. d. Staats-inst. f. Exp. Ther. u. d. Georg Speyer-Hause zu Frankfurt a.M.* 1934. No. 29. pp. 12–45. [71 refs.]

The course of an infection with *Trypanosoma prowazeki* in the white mouse was uninfluenced by splenectomy, ligature of the spleen, implantation of splenic tissue or blockade of the reticulo-endothelial system with India ink, whatever the interval between the operation and the inoculation. Relapsing fever produced by a Russian strain of spirochaete was also entirely uninfluenced by these procedures, as was the tolerance of the mouse for neosalvarsan and neosilver salvarsan. Removal of the spleen did, however, influence the curative action of neosalvarsan; fourteen days after interference with the reticulo-endothelial system the minimal curative dose was greater than normal, though 121 days after the operation the curative dose was again normal. Ligature of the spleen had a similar effect, but implantation of splenic tissue and blockade of the reticulo-endothelial system had no action on the curative dose of neosalvarsan. Similar results to those with neosalvarsan were obtained with neosilver salvarsan. Extirpation and ligature of the spleen also decreased the curative action of arsonic acid. It is concluded that the curative action of the arsenobenzoles is in some way related to the function of the reticulo-endothelial system. *G. M. Findlay.*

Stinnesberg (Martha). Brief aus Ostafrika. Die ersten sechs Jahre im kath. Missionshospital Ndanda, T.T.-Ost-Afrika. [**Six Years in a Mission Hospital, Tanganyika Territory.**]—*Muench. Med. Woch.* 1934. Mar. 2. Vol. 81. No. 9. pp. 333–335.

A general account of disease conditions seen at this Mission Hospital, inland from Lindi in Tanganyika Territory. More than half suffered from yaws, *i.e.*, 19,031 in 6 years. *A. G. B.*

Antunes (P. C. de Azevedo) & Lane (J.). Nota sobre a distribuição geografica dos culicideos (Diptera) de São Paulo (Brasil).—Reprinted from *Rev. Biol. e Hig.*—1933. Dec. Vol. 4. No. 3. 7 pp. [Issued as Boletim No. 50 do Inst. de Higiene, São Paulo.]

Cawston (F. G.). The Control of Respiratory Disease in the Tropics.—*Jl. Trop. Med. & Hyg.* 1933. Nov. 1. Vol. 36. No. 21. pp. 333–334.

Cawston (F. G.). Some Effects of a Prolonged Drought on Disease-Carriers.—*Jl. Trop. Med. & Hyg.* 1934. July 2. Vol. 37. No. 13. pp. 195–196.

Courboulès (P.) & Mandillon (G. A. L.). Accidents graves survenus après une piqûre d'hyménoptère.—*Arch. Méd. et Pharm. Milit.* 1934. Mar. Vol. 100. No. 3. pp. 297–303.

Dunnewold (R.). Een nieuwe anopheles-larve (*A. Leucosphyrus* var. *Hackeri* ?). —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1934. Jan. 30. Vol. 74. No. 3. pp. 170–173. With 1 fig. English summary.

Fróes (Heitor P.). Doenças ou afecções causadas por animais vulnerantes, toxicos ou eletrizantes.—Reprinted from *Jl. dos Clinicos.* 1933. Mar. 15 & 31, & Apr. 15. Nos. 5, 6 & 7. 29 pp.

Fróes (Heitor P.). Estudo experimental sobre o veneno dos Niquins (Thalassophrynidae).—Reprinted from *Bahia Medica.* 1933. Oct. No. 10. 9 pp. With 1 fig.

Fróes (Heitor P.). Contribuição ao estudo da ação vesicante dos potós (Coleopteros vesicantes).—Reprinted from *Jl. dos Clinicos.* 1934. Feb. 28. No. 4. 22 pp. With 4 figs. [14 refs.]

Fróes (Heitor P.). Estudios sobre los peces toxiforos del Brasil. Algunos experimentos con *Thalasso-phrynidae.*—*Medicina Paises Cálidos.* Madrid. 1934. Feb. Vol. 7. No. 2. pp. 49–52. With 2 figs.

Germain (Louis). Mollusques terrestres et fluviatiles de l'Afrique Occidentale Française. [Mission A. Chevalier, 1931–1932.]—*Bull. Comité d'Etudes Historiques et Scientifiques de l'Afrique Occidentale Française.* 1933. Apr.–June. Vol. 16. No. 2. pp. 169–236. With 8 figs. [Refs. in footnotes.]

Govi (Luis). Aspecto social e importancia económica.—*Semana Méd.* 1934. Apr. 19. Vol. 41. No. 16 (2101). pp. 1201–1210.

Grasset (E.). Etudes comparées sur l'immunité antitoxique chez les reptiles.—Reprinted from *Deuxième Congrès Internat. de Path. Comp.* 3 pp.

Grimaldi (Valentino). Gli ixodidi delle Colonie Italiane e le malattie da essi trasmesse.—*Arch. Ital. Sci. Med. Colon.* 1934. July 1. Vol. 15. No. 7. pp. 504–513. [10 refs.] English summary (2 lines).

Impastato (Aldo). Di alcune affezioni chirurgiche riferentisi alla patologia coloniale.—*Arch. Ital. Sci. Med. Colon.* 1934. Apr. 1. Vol. 15. No. 4. pp. 266–284. With 6 figs. English summary (3 lines).

Kampmeier (R. H.) & Hinman (E. H.). Mite Infestation in the Human Intestine.—*Southern Med. Jl.* 1934. Mar. Vol. 27. No. 3. pp. 271–274. With 1 fig.

Larsen (Albert E.). Some Medical Observations in the Pacific Islands and Dutch East Indies.—*California & Western Med.* 1934. June. Vol. 40. No. 6. pp. 413–417. With 5 figs.

Massias (C.). La fièvre typhoïde en Cochinchine. Etude de 89 cas à l'hôpital de Soctrang.—*Bull. Soc. Path. Exot.* 1934. May 9. Vol. 27. No. 5. pp. 406–413. With 1 chart. [11 refs.]

de Mello (I. Froilano). Le Service de Santé à l'Inde Portugaise (1929).—*Arquivos da Escola Méd.-Cirurg. de Nova Goa.* Ser. B. 1933. No. 4. pp. 784–829. [Main Report in French pp. 784–816 ; Appendix in Portuguese headed " Pontos de higiene e epidemiologia peculiares a algumas delegacias. (Notas tomadas aos relatórios anuais dos Delegados e Sub-delegados de saude.) pp. 817–829.]

Millous. Note sur le rhumatisme aigu et les particularités des arthrites aiguës sous les tropiques.—*Ann. de Méd. et de Pharm. Colon.* 1934. Jan.–Feb.–Mar. Vol. 32. No. 1. pp. 70–78.

O'Flynn (J. A.) & Rudd (E. T. S.). A Case of Rhinosporidiosis.—*Jl. Roy. Nav. Med. Serv.* 1934. July. Vol. 20. No. 3. pp. 258–260. With 2 figs.

Panagia (Antonino). I protozoi parassiti intestinali dell'uomo in 500 esami consecutivi di feci, eseguiti nell'Istituto di Parassitologia Medica di Roma.—*Policlinico.* Sez. Prat. 1934. Mar. 12. Vol. 41. No. 10. pp. 368–371.

Parrot (L.). Notes sur les phlébotomes. VII.—Sur la présence de *Phlebotomus sergenti* dans le Tassili des Ajjers (Djanet, Sahara central).—*Arch. Inst. Pasteur d'Algérie.* 1934. Mar. Vol. 12. No. 1. pp. 77–78.

Parrot (L.). Notes sur les phlébotomes. VIII.—Présence de *Phlebotomus perniciosus* var. *tobbi* Adler et Theodor, 1930 en Georgie (U.R.S.S.).—*Arch. Inst. Pasteur d'Algérie.* 1934. Mar. Vol. 12. No. 1. pp. 79–82. With 2 figs.

Penso (Giuseppe). Il " latah " nella Somalia Italiana.—*Arch. Ital. Sci. Med. Colon.* 1934. May 1. Vol. 15. No. 5. pp. 364–367. With 1 fig. English summary (4 lines).

Ricci (Emanuele). Nosografia delle oasi di Cufra (Cirenaica). (Nota preliminaire.)—*Arch. Ital. Sci. Med. Colon.* 1934. June 1. Vol. 15. No. 6. pp. 451–463. With 4 figs. English summary (3 lines).

Robinson (W.) & Simmons (S. W.). Surgical Maggots in the Treatment of Infected Wounds : Recent Apparatus and Methods in Maggot Production and Research.—*Jl. Lab. & Clin. Med.* 1934. Jan. Vol. 19. No. 4. pp. 339–343. With 2 figs.

Sinton (J. A.). Notes on Some Indian Species of the Genus *Phlebotomus*. Part XXXVI. Diagnostic Table for the Males of the Species Recorded from India.—*Indian Jl. Med. Res.* 1933. Oct. Vol. 21. No. 2. pp. 417–428. With 75 figs. on 4 plates. [67 refs.]

Smith (E. C.). *Postmortem* Report on a Case of Sickle-Cell Anaemia.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1934. Aug. 4. Vol. 28. No. 2. pp. 209–214. With 4 figs. on 1 plate. [11 refs.]

Soltero (A. Garcia). Fiebre por la mordedura de la rata.—*Bol. Asoc. Med. de Puerto Rico.* 1933. Oct. Vol. 25. No. 10. pp. 557–560.

Strong (W. M.). The Health of the People of Papua. [Correspondence.]—*Med. Jl. Australia.* 1934. Jan. 20. 21st Year. Vol. 1. No. 3. pp. 107–108.

Theodor (Oskar). Some African Sandflies.—*Bull. Entom. Res.* 1933. Dec. Vol. 24. Pt. 4. pp. 537–547. With 5 figs. & 2 plates. [18 refs.]

Wolter (A.). Die Daktylitis bezw. Phalangitis bei Syphilis, Tuberkulose, den "Sarkoiden im weiteren Sinne" nach Darier (Lupus Pernio und Sarkoid Boeck), Framboesie und Lepra. Eine röntgenologische und histologische Betrachtung.—*Klin. Woch.* 1934. June 2 & 9. Vol. 13. Nos. 22 & 23. pp. 811–816; 846–852. With 12 figs. [54 refs.]

Zavattari (Edoardo). L'ainhum nel Fezzan.—Reprinted from *Arch. Ital. di Dermat.* 1934. Vol. 10. No. 3. pp. 343–344. With 1 fig.

REVIEWS AND NOTICES.

WIGGLESWORTH (V. B.) [M.A., M.D., Lecturer and Milner Research Fellow in Medical Entomology, London School of Hygiene & Tropical Medicine]. **Insect Physiology.**—pp. x+134. With 13 figs. Monographs on Biological Subjects. 1934. London: Methuen & Co. Ltd., 36 Essex Street, W.C. [3s. 6d.]

The author presents a compact account of the physiology of insects. It is noticed here because of its importance to the applied entomologist and to those who enquire into the epidemiology of insect-borne diseases.

The reviewer was aware that much work has been published on insect physiology (indeed the author appears to have read about 2,000 papers relating to the subject): he was therefore most interested to discover whether it had been possible to write a connected account of it, for it is difficult to say at what point one should start. Wigglesworth's arrangement is original and successful. For him the insect is a small terrestrial animal with a hard covering which can resist loss of water. He therefore deals first with the cuticle of insects, describing its structure and chemistry. The rigid properties of the cuticle determine moulting and the peculiar growth by sharply defined stages. Moreover, as respiration throughout the general surface of the insect is greatly hindered by the cuticle, a more specialized system must be developed. But the tracheal system of respiration, depending largely as it does on the process of diffusion, can only be effective up to a certain limit of size, so that the insects have always been small. But as they are small, with a large area of surface for each unit of volume, the danger of fatal loss of water is the greater. They must therefore economize water in their processes of excretion, digestion and respiration.

To readers of this *Bulletin*, certain parts of the book possess technical interest; for it is the physiologist alone who can explain why it is that particular insects are limited by climatic factors or are more abundant at one season than another. The author considers also the surface forces which exclude water but permit the entry of oil into the respiratory system of mosquito larvae. Parts of the book therefore relate immediately to applied entomology, but beyond that it will greatly improve our understanding of the life of insects. This is of great practical importance, for nearly all the problems which face the applied entomologist are physiological: he wants to know whether the yellow-fever mosquito could establish itself in this country, or why it is that the resistance of insects to fumigants is so complex, or why the females choose a particular place for oviposition. Such topics as these are discussed, and to some extent explained, in the book which is before us. The author has certainly succeeded in presenting the subject in a unified way. *P. A. Buxton.*

CALCUTTA. **Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases 1933** [ACTON (H. W.), Director].—174 pp. With 8 plates & 1 chart. 1934. Alipore: Bengal Govt. Press.

This report of the Director of the School and Superintendent of the Hospital also contains more detailed reports of professors at the school and of the routine and research departments. Many of these

reports are themselves scientific contributions, even in their official form, and present the results of research work which has either been published or will be published. Some of these may be briefly noticed :—

In the short period of two months 704 strains of vibrios were isolated from 470 clinical cases of cholera. Analysis showed that " the rough strains of vibrio were found generally after the fifth day of disease and the frequency of rough strains was most marked towards the end of the epidemic." Both agglutinability and lysability of vibrios received special attention. " None of the non-agglutinating vibrios were lysable by cholera phage type A," but many of them underwent lysis by a mixed cholera phage. These variations in character of the isolated vibrios are of the greatest interest for the much disputed questions of transformation or transmutation of cholera vibrios, and above all because the strains are taken direct for examination from the clinical case of cholera. Variation in character has been studied not only from case to case but also in the same case. Thus, for example it was found that whereas in the first two days of the disease agglutinating vibrios were isolated " from 82 per cent. of the cases examined, from the third day of the disease onwards the frequency with which agglutinating vibrios can be isolated decreases." Again the relative proportions of non-agglutinating to agglutinating vibrios were at the beginning, the height and the decline of the epidemic as 1 to 5, 1 to 7 and 1 to 1·5 respectively. A very good suggestion is made for the application of the alternate case method to current hospital cases and is worth noting for adoption elsewhere, where accommodation is available. It was to set apart two wards and admit alternately to each ward, " the treatment in the two wards to be identical except that in one ward bacteriophage would be used in addition." The results of this trial applied to 290 cases treated with cholera phage and 180 without were 42 (14·5 per cent.) deaths and 40 deaths (22·2 per cent.) respectively.

A new malaria parasite of the monkey (*Silenus irus*) has been found and is named *Plasmodium knowlesi*. This parasite, used in the monkey, has furnished valuable results for the scientific therapy of malaria. Many attempts have been made to transmit malaria from man to the monkey but all have failed in the lower apes, " whereas monkey malaria of the lower apes (*P. knowlesi*) can be readily transmitted to man."

A research in connexion with the treatment of chronic intestinal amoebiasis promises good results and the criterion of cure was the negative character of the six stools after the completion of treatment. The remedy tried was " carbarsone" in 73 cases admitted to hospital. Sixty of these were discharged as " cured " after a 10-day course of treatment. Carbarsone is harmless, easy to take and non-toxic.

An interesting case of rat-bite fever, or rather the causative organism *Spirillum minus*, was found in the nasal mucosa of a leper. Its presence there is traced to a probable bite of a rat through an anaesthetic area of which the leper remained unaware.

Research work has continued on a large number of indigenous drugs. One of these researches was rather out of the ordinary run of such investigations. It was an endeavour to help the Indian Tea Association " to prepare a good beverage from an infusion of tea. . . . A really fine beverage was finally produced," a beverage with the

character of a cider. It was tested and approved of by an informal committee at the Bengal Club. Another interesting study led to the finding that the country beers of India " have a low alcoholic content and a high nutritive value, being rich in vitamines. In areas where these beers are drunk, there is marked absence of vitamine deficiency diseases."

Many other points of interest might be extracted from the several reports presented in this annual publication. The subjects which are treated from a research point of view are called " enquiries " and these are: Kala azar, leprosy, skin diseases, malaria transmission, indigenous drugs, drug addiction, blood changes in tropical diseases, hookworm, filariasis, malaria, standardization of Indian foodstuffs, and respiratory diseases. The mere enumeration of the subjects of investigation shows the range of research activity, while the researches themselves are on a scale which is not easily available in many other parts of the world. It is pleasing to read of the direct and indirect financial support accorded to the School by the Bengal Government, the Indian Research Fund Association, important commercial industries, and of the printing house which is so closely associated with the publication of its important memoirs. One may hope that this weighty support may continue unabated for the weighty subjects dealt with. They represent the good dividends paid on the capital invested.

W. F. Harvey.

Bose (J. P.). [M.B. (Cal.), F.C.S. (Lond.), etc.] **A Handbook on Diabetes Mellitus and its Modern Treatment.** Second Edition. Thoroughly Revised, Partly Rewritten and Brought Up to Date with Two New Chapters.—pp. xviii+232. With 5 charts, 6 figs. & 1 coloured plate. 1934. Calcutta: Thacker, Spink & Co. [Rs. 6/8.]

This is a new edition of a book reviewed favourably in this *Bulletin* as recently as 1929 [Vol. 26, p. 426]. It has, the author tells us, been thoroughly revised and includes two entirely new chapters and two appendices. The parts dealing with carbohydrate metabolism, pathology and treatment have been rewritten. His object is to destroy the fatalistic attitude to diabetes which, he says, is far too prevalent in India. This edition has the advantage of a preface from Sir John Megaw who anticipates a large demand. Clearly the book has met a need.

A. G. B.

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